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Energy Dependence and National Security

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ABSTRACT

The goal of this MSc Thesis is to demonstrate that reliance on traditional means of energy-energy dependence, such as fossil fuels, can lead to interstate and international conflicts, wars, and threats to national security. This will be proven considering various analyses and by providing historical and current examples. This thesis begins by presenting multiple reasons as to why a global energy shift and the end of the energy dependence are necessary and beneficial. Subsequently, the study emphasizes the importance of an energy transition due to challenges such as resource wars, climate change, water scarcity, etc. Furthermore, through historical examples and references to European and Greek energy policies and options, it demonstrates that transitioning to renewable energy sources, to achieve energy independence, is the only viable solution for achieving a stable and sustainable energy sector, thereby enhancing the nation's position in the international system of nations.

Contents

Introduction

The year 1904, in his book "The Geographical Pivot of History", Halford J. Mackinder, a young British geographer, stated that the vast Eurasian territory, now Eastern Europe, possessed a powerful ''Heartland,'' and whoever controlled it would dominate the world. Essentially, Central Asia's natural resources, "the great pivot", are so vast that they will serve as a geostrategic instrument for the state that controls it to become "the world's empire".[1]This emphasized the significance of geography and land power in shaping global politics and conflicts, as well as the primary role of natural resources in policymaking.

Since the early twentieth century, the energy sector has played an important role in international relations primarily through the utilization of minerals and fossil fuels. Fossil fuels are hydrocarbon materials formed millions of years ago during a process in which decomposed dead animals and plants undergo deep discomposure at high temperatures, eventually forming what we know as fossil fuels. They were formed because of geologic processes acting on the remains of organic matter produced by photosynthesis, a process that began in the Archean Eon 4.0 billion to 2.5 billion years ago.[2]The three main types of fossil fuels are coal, natural gas, and oil, with natural gas being the most environmentally friendly of the three.

The burning of fossil fuels has produced energy that has played a significant role in the development of human civilization, and the transition from one fossil fuel to another has consistently coincided with pivotal periods for humanity and international relations. For instance, when coal emerged in the early 1800s, it marked a transformative era for humanity, the Industrial Revolution. The Revolution that began in Great Britain in the mid of the 19th century, dramatically decrease the use of traditional biomass, such a wood charcoal etc.[3]The importance of this transition is rooted in the fact that it brought the alteration from agriculture economy to manufacturing economy, increasing production, urbanism, wages and improving the quality of life[4]. Similarly, since the early 1900s, oil has been especially important in the field of study of International Relations, dominating markets following the end of World War II and the subsequent economic development. However, reliance on fossil fuels has posed serious security and environmental risks. Access to and control of energy resources has been a factor in international conflicts and alliances, bringing the issue of energy security to the forefront, particularly in the post-World War II era.

In this context, the transition to cleaner energy sources has become increasingly important for both national and foreign policy objectives. Energy is primarily associated with fossil fuels, with coal being the primary source at the turn of the twentieth century, followed by oil, and finally

[1] (Knutsen, 2014)
[2] (Kopp, 2023)
[3] (De Vries, 1994)
[4] (Landes, 1969)

natural gas in the 1970s as a response to the 1973 and 1979 oil crises.[5] However, due to the security and environmental risks that reliance on fossil fuels poses, transition, has become a matter of urgency. In 2021, fossil fuels accounted for 61,3 percent of global electricity output, according to the International Energy Agency (IEA). As a result, it is critical that a state's foreign and domestic goals include control of its energy resources to mitigate environmental risks and ensure national security.

[5] (Smil, 2018)

PART I

1. Theoretical Framework

The access to and control of energy resources has been a significant factor in international conflicts and alliances, generating substantial interest among experts in the field and sparking extensive discussions within the academic discipline of International Relations (IR). Although there have long existed notions linked to International Relations, this discipline was widely systematized from the beginning of the 20th century in the West, particularly in the USA as that country gained in strength and prominence.[6]

More specifically, International Relations as a field of study has its origins in the early modern period, when European states began to establish diplomatic relations with one another and with non-European powers. The Treaty of Westphalia, which ended the Thirty Years' War in 1648, is often referenced as an important moment in the development of the modern state system,[7] which is a core principle in International Relations. However, formal academic study of International Relations did not begin until the late nineteenth and early twentieth centuries, when scholars and policymakers became ever more eager to comprehend the causes and consequences of national conflict and cooperation. This was a post-World War I outcome. A growing demand for less dangerous and more effective ways of conducting relations between people, societies, governments, and economies; a surge of writing and research inspired by the belief that systematic observation and inquiry could dispel ignorance and serve human betterment; and the popularization of political affairs, including international affairs, all contributed to the field's growth. This growing popularity of International Relations strengthened the belief that general education should include foreign affairs teaching, and that information should be advanced in the interests of increased public control and oversight of foreign and military policy.[8]

Although there are a few theories that attempt to provide insight into International Relations, Realism is the oldest and most frequently employed school of thought. Since the end of World War II, realism has dominated the International Relations discipline.[9] Realism is a strategic framework to world politics that focuses on how factors such as

[6] (Hoffmann, 1995)
[7] (Matthew D. Balentine, 2020)
[8] (McClelland, 2022)
[9] (Bell, 2022)

power, national interest, scarce resources and international anarchy, all influence how international relations are shaped. Realists believe that countries are motivated by their own interests and use their power to advance their own personal goals often to the detriment of others.[10]

Realism in International Relations is generally considered to have emerged as a dominant school of thought in the mid-20th century, particularly after World War II. The ideas behind realism, however, have deep roots in the history of political thought and can be traced back to ancient Greek thinkers like Thucydides and Machiavelli in the Renaissance. Realism as a modern theory of international relations is frequently associated with mid-century scholars such as Hans Morgenthau, Reinhold Niebuhr, and George F. Kennan. Most realists share some fundamental concepts and views about the nature of International Relations that fit under the term of "realism," yet there is a distinction between two main theories: classical realism and structural realism or neo-realism. To proceed, all realism approaches believe that states, rather than sub-state or supra-state actors or institutions, are the most important "actors" or "players" on the international stage. Due to the lack of governing authority in the international system of nations, states are the most powerful actors; this is a severe symptom of rivalry and contention.[11] Many researchers of realism, such as Hans Morgenthau and Kenneth Waltz, hold the opinion that resource scarcity can result in conflicts between states.

In particular, classical realism emphasizes the nature of humans and their proclivity for conflict, as well as the significance of state sovereignty and the desire for power and security. Classical realists stress that the international system is anarchic, which means that there is no central authority above the state and that states must depend on their own strength to survive. They also contend that states will participate in war to keep or increase their authority and security. In classical realism it is believed that nations live in a state of rivalry, therefore all nations must constantly be concerned that their own failings and other nations' increases in power may result in a situation where they are inferior to other nations, which they must try to avoid at all costs, since the desire to acquire the most power is universal.[12]

On the other hand, structural realism, also known as neorealism, concentrates on the structural variables that influence International Relations, such as state power distribution. According to structural realists, states are limited by the international system's structure, which is characterized by the allocation of power, and the acquisition

[10] (Bell, 2022)
[11] (Antunes, 2018)
[12] (Morgenthau, 1972)

of power is driven by systemic forces rather than individual state behavior.[13] Structural realists, like Kenneth Waltz and E.H. Carr as well as some classical realists, like Hans Morgenthau, also argue that the international system's anarchy limits the effectivity of international organizations and cooperation, and that states must rely on their own power to reach their goals. In brief, neorealists, think that the structure or components of the international environment, particularly the distribution of capabilities or power among states, are the most significant causes and determining factors in global politics and the formulation of foreign policy.

It is possible to argue that the global energy industry acts as a catalyst for interstate conflict and war. The primary justification for this statement is the scarcity of resources for producing energy, particularly fossil fuels. There is also a recurring conflict between producer- states and consumer- states interests since producers want to maximize prices and the rents they receive from the exploitation of energy, whilst consumers want lower costs and a steady supply of energy to be secured. Governments of both consumers and producers are at odds for access to the best energy supplies and for a share of the world's markets. Inter-state energy disputes may result from these tensions and insecurity. These international disputes range in severity from disputed energy price negotiations to trade and investment restrictions to, in certain cases, resource wars.[14]Resource wars are included in the theory that states that conflict and war in the modern world can be significantly fueled by competition for natural resources like oil, gas, minerals, and water. It examines how inter-state tensions, armed conflicts, and geopolitical dynamics can all be influenced by access to and control over vital resources.[15]

A theory that draws its foundation from structural realism, explaining the dispute between states and access to energy sources, is the geopolitical approach. It approaches energy security from an "access-based" perspective, depending on whether nations have equal access to energy resources. According to the theory, hydrocarbons are seen as limited resources of existential importance for contemporary economies and the military, and access to these scarce resources is seen as the main issue with energy security. Risks to the supply of energy are seen as a possible security hazard in the importer's economies due to their reliance on foreign suppliers, particularly the possibility that supplies may be halted. One of the main reasons this happens is that the outsized economic significance of energy makes it a significant coercive tool in a state's foreign policy inventory for generating states. The geopolitical approach further claims that the security consequences of inter-state energy connections are fundamentally conflictual, revealing

[13] (Waltz, 1979)
[14] (Wilson, 2018)
[15] (Klare, Resource Wars: The New Landscape of Global Conflict, 2001)

its conceptual similarities to structural realism. World energy reserves are seen as a finite and steadily depleting resource that states compete in unfair competition for control over and/or access to.[16]

These disputes are caused by a few variables. Some researchers believe that global instability is the main factor currently. According to the realism theory, this instability comes from the lack of a global governing power. Also, the emergence of multipolar patterns linked to rising powers from the developing world and the patterns of great power struggle that have resulted is highlighted. Other scholars point to some "rising nations" aggressive energy policy behavior. Governments with nationalistic energy policies that promote interstate energy competitiveness are commonly recognized as Russia and China.[17] Another factor is the cycles of the global economy, with concerns over energy security and conflict-like behavior, thought to rise during boom supply times and decline during busts.

2. Energy Security and Geopolitics of Energy

The realistic approach to International Relations proves that there is a direct interconnection between International Relations and the energy sector due to fossil fuels being considered scarce resources. The geopolitics of energy examines this intersection of energy, security, and international politics.[18] One of the main aspects that is examined within the broader field of energy geopolitics is energy security. Geopolitical analyses of energy resources frequently consider how national concerns about energy security affect International Relations. This entails researching subjects like energy diversification, dependence on nations or regions for energy, resource competition, flaws in the energy infrastructure, and the likelihood of geopolitical tensions or conflicts over energy access and control. In brief, while ensuring a consistent and uninterrupted energy supply is a specific concern of energy security, the geopolitics of energy examines the broader geopolitical implications of energy resources and their impact on international politics and global security, including energy security issues.[19] Energy security is the first and most important step to national security.

Energy security is also a broad term that cannot be defined in a single sentence. Changes in the perceived importance of the energy security aspects among foreign and domestic

[16] (Wilson, 2018)
[17] (Wilson, 2018)
[18] (Geopolitics of Energy Project, n.d.)
[19] (Roman Vakulchuk, Renewable energy and geopolitics: A review, 2020)

priorities at the national policy level have resulted in changes in the ideologies' substance. However, it has been suggested that the term "energy security" is evaluated at four different levels: a. On an international level b. On a regional level c. On a national level d. On a local level. Global energy markets, interdependencies between nations, and international cooperation are the main topics at the international level. The regional level considers the energy dynamics within a particular geographic area or between nearby nations. At the national level, energy infrastructure, policies, and domestic energy supply and demand are examined. Concerns about energy security are examined at a more localized level at the local level, such as within a community or particular energy infrastructure. It also means that everyone has access to the necessary energy goods. If one of these levels is energy disrupted, then all the above have been disrupted, like a chain reaction, showing the interconnection of the energy sector at all levels.

However, the four A's: availability, affordability, accessibility, and acceptability, are one of the most well-known elaborations of the energy security concept and the starting point for contemporary energy security studies. Two of the four As - availability and affordability - were already prominently featured in classic energy security studies. The International Energy Agency (IEA) still uses this traditional approach to define the concept of energy security "as the continuous availability of energy sources at an affordable price". The other two As, accessibility and acceptability, have a more complicated background. Both were listed as global energy goals in the World Energy Council5's Millennium Declaration (WEC, 2000), but they were not linked to energy security until the 2007 APERC report.[20]

As mentioned before, the geopolitics of energy investigates the intersection of international and national security, politics and energy security,[21] forming a distinct branch of International Relations studies that has been growing in popularity for the last 50 years and specifically since the Oil Crises of 1973 and 1979.[22]

Thus, the interaction of international security, politics, and energy security is examined by the geopolitics of energy, ever since the 1970's decade and it currently encompasses the link between environment and energy and national and international security.[23]The Geopolitics of Energy suggests a double awareness. First, an abundance of energy can support all our basic everyday needs. Second, energy has always had a crucial role in determining power in the global system. International politics alter as a result of changes

[20] (Cherp, 2014)
[21] (Geopolitics of Energy Project, n.d.)
[22] (Salameh, 2004)
[23] (Cherp, 2014)

in national energy policies. Exploring how nations design their grand plans to satisfy their energy demands, as well as the effects of such action on other nations and international politics, is the subject of energy geopolitics. Saying that energy abundance ensures military power, economic prosperity, and social stability, which are all essential to a state's survival.

Energy security is therefore a national security issue. In fact, a country's ability to access the energy resources required to maintain its current level of national power without compromising its foreign policy, economic, social or environmental objectives is what is meant by energy security in an International Relations (IR) perspective and it merely indicates a powerful nation in the international system of nations.[24]

The traditional theory of energy security in the geopolitics of energy puts front and center oil, and then natural gas and coal.[25] Indeed, in the 1970's decade, energy security was connected to oil security, because of the severe consequences of the Oil Crises of 1973 and 1979.[26]But even to this day, a significant part of energy security is still connected to oil, gas and coal. According to IEA, in 2019, around 80,9% of global primary energy came from coal, oil and gas.[27]The reason for this is the importance of oil and gas to the global economy and the fact that they are transported over great distances from a few big production hubs to customers dispersed throughout the globe which makes them the primary cause of competitiveness, tensions, policy disputes, and even wars regarding security. Therefore, the energy supply chain affects their perception of energy security. This competitiveness separates energy security priorities for producers/exporters of energy resources from consumers/ importers. The most crucial aspect of the concept for exporters is the assurance of demand for their energy supplies, or, to phrase it differently, the assurance of energy market revenue security. In contrast, most customers prioritize energy security and security of supply.[28]

[24] (Paravantis, 2019)
[25] (Klare, Resource Wars: The New Landscape of Global Conflict, 2001)
[26] (Salameh, 2004)
[27] (IEA, World Energy Balances: Overview, 2019)
[28] (Roman Vakulchuk, Renewable energy and geopolitics: A review, 2020)

3. Oil Crises

Scholars of International Relations (IR) have developed a revived interest in energy security in recent decades.[29]This is due to the codependence of the energy sector on the economy and the prosperity of the national and international system, fully demonstrated by the phenomenon of globalization, so it was elevated to a primary issue for policymakers. A highly significant time was the Oil Crises of 1973 and 1979, that badly impacted Western countries and were perhaps the most prominent instance of occurrences that elevated energy security to the top of political agendas. OPEC exporters demonstrated how susceptible importing nations and economies are to energy disruptions. The Oil Crises are a prime example of why energy dependence is harmful and must be averted.

So, what exactly happened that altered the course of the energy sector in International Relations? The 1973 and 1979 Oil Crises revealed that the oil industry's most prominent stakeholders can easily influence market trends. OPEC is one of, if not the, most powerful ''players'' in the energy industry. It is also worth noting that the global oil market is considered an oligopoly market and oil revenues are high compared to the costs of its production.[30] OPEC is the dominant stakeholder, accounting for 80.4% (1,241.82 billion barrels) of the world's proven oil reserves.[31]OPEC, or the Organization of Petroleum Exporting Countries, was founded on September 14th, 1960, in Baghdad by Saudi Arabia, Iran, Iraq, Venezuela, and Kuwait. The goal of developing a unified oil policy and giving financial and technical help to its members. Qatar (1961), Indonesia (1962), Libya (1962), and Abu Dhabi (1962). (1967). In the ensuing years, Algeria was also admitted (1969). Members include Nigeria (1971), Ecuador (1973), Angola (2007), Equatorial Guinea (2017), the Republic of the Congo (2018), and the United Arab Emirates. Saudi Arabia wields the most influence within OPEC, accounting for approximately one-third of OPEC's crude reserves.[32] The primary reason for its formation was to seize control of oil production, pricing, and exports, specifically to prevent oil producers from lowering their

[29] (Wilson, 2018)
[30] (Mutar Zubaidi, 2021)
[31] (OPEC, 2022)
[32] (Danielsen, 2023)

prices. The organization's supremacy in the oil sector was revealed during the first Oil Crisis in 1973, a pivotal moment in the oil industry's history.

Indeed, until the year 1973, the price of oil increased slowly and consistently until OPEC imposed an embargo on the US in response to the US and the West's assistance to Israel in the Yom Kippur War against Egypt. Prices increased from 3 USD per gallon to 12 USD.[33] The 1973 Energy Crisis was severe enough that GDP fell by 4.7% in the United States, 2.5% in Europe, and 7% in Japan. An energy crisis is deemed serious enough to cause a worldwide slowdown and a decrease in global real GDP. The significance of the 1970s oil shocks and the events that followed should be underlined, not solely due to the changes that occurred in the oil market at the time, but also because it brought up the subject of energy security. Given the vital part that energy serves in daily life, energy security is a critical concept. Energy security implies that all energy-dependent nations have a continuous, uninterrupted, affordable, and sufficient energy supply. The gravity of the Oil Crises of the 1970s revealed that this was not always the case. On a different facet of the issue, energy security also entails the ability of energy exporting nations to sell constantly at set prices and quantities, therefore energy security is connected to the energy security of demand. For example, for Russia, ensuring the security of demand entails reestablishing state control over strategic resources and gaining dominance over the main pipelines and market channels through which it transports hydrocarbons.[34]

4. The Formation of IEA

An immediate outcome of the Oil Crises of 1973 and 1979, was the institutionalization of the energy sector. Specifically, as the importer states, which were heavily reliant on imported oil, were left utterly shocked by the effects of the first Oil Crisis, they understood two major facts about the oil industry. First, the political character of the Arab nations' decisions solidified the idea of energy being used as a weapon, with unpredictable consequences for national economies. Second, the embargo proved the fragility of importers' economies to disruptions in physical oil supplies and rapid price rises. Consequently, major importers were forced to consider international measures to ensure future supply security. The result was the formation of the International Energy Agency - IEA in November of 1974.[35]

[33] (Salameh, 2004)
[34] (Yergin, 2006)
[35] (Yergin, 2006)

Austria, Belgium, Canada, Denmark, Germany, Ireland, Italy, Japan, Luxemburg, the Netherlands, Norway (under a special Agreement), Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States were the IEA's original members. Greece (1976), New Zealand (1977), Australia (1979), Portugal (1981), Finland (1992), France (1992), Hungary (1997), Czech Republic (2001), Republic of Korea (2002), Slovak Republic (2007), Poland (2008), Estonia (2014), México (2018), and Lithuania (2018) followed. The IEA incorporates a collective emergency reaction mechanism to ensure market and global economic stability. It has been engaged five times since the Agency's inception, the fourth and fifth occasions in 2022, following Russia's recent invasion of Ukraine.[36] When it was created, IEA functioned as a leveling organization to OPEC.

5. After the Oil Crises of the 1970'S

Since the Oil Crises occurred, there has been a shift in how importers view energy security, and they now believe they can withstand energy crises better. Based on this statement, it is considered that there are 4 main principles indicative to maintain energy security, according to the American Author and energy expert, Daniel Yergin. First, the diversification of energy supply offers alternative choices in a case of an emergency. Second, a resilience that includes proper energy infrastructure, strategic reserves and plans in a case of a disruption, etc. Third, abiding by the rules of integration: the fossil fuels (oil) market is global, so severance is not a possibility. Finally, is access to proper information on the global energy market. The IEA has been a pioneer in this area. [37]

Observing that states begin from varying starting points in terms of energy security, current energy plans and policies are influenced by more complex economic, geopolitical, and ideological considerations than they were in the 1970s.[38]Due to this, some of them adopt a nationalistic perspective on energy security, frequently involving a willingness to use force, either military or economic, to defend their energy interests. Other nations demonstrate a greater comprehension of the necessity for institutionalized, collective efforts to achieve energy security. The above global status may result in two outcomes: First, international energy cooperation. Second, war- conflict between producers or importers, known as resource conflict. In resource conflicts energy control and supply may be the deciding element in conflicts, or they may simply be conflicts where resources

[36] (IEA, History From oil security to steering the world toward secure and sustainable energy transitions, n.d.)
[37] (Yergin, 2006)
[38] (Cherp, 2014)

serve as one of several catalysts rather than acting as the main driver.[39] In the 21st century, there are two indicators that the energy sector is a possible threat to national and international security but by traditional means: energy-related war conflict, like the wars in the Middle East and by terroristic attacks on energy infrastructure.[40]

The importance of energy is indicating a source of dispute or even war. Undoubtedly, an interruption in the supply of oil, gas, or electricity can have serious consequences for society, economies, and people. Consequently, energy security is regarded as a benefit to society, as well as to nations. Therefore, the security of energy is a political issue. As mentioned before, from the perspective of International Relations (IR), what is meant by energy security is a country's capacity to access the energy resources necessary to maintain its current level of national power without jeopardizing its foreign policy, economic goals, social goals, or environmental goals. When energy insecurity has an impact on a nation's governing policies, energy becomes a national security and foreign policy concern.[41]Diversifying energy sources, assuring local production, and safeguarding distribution and access are all ways we can assure energy security. Moreover, the environmental impact of the longstanding burning of fossil fuels, adds another aspect to energy security, the one of environmental protection or the other two as to the energy security notion: accessibility, and acceptability.[42]The instability and insecurity caused by the competition of nations for access to energy sources and the environmental security factor have altered the connection of energy and national security, adding renewable energy sources to the equitation.[43]

Concluding, the concept of a geopolitical power in traditional means is mutable and a powerful nation may no longer be only a nation that has access to fossil fuels. The influence of climate change mitigation policies on the traditional idea that power comes from possessing fossil fuels is great, proving that the energy and national security concept is everchanging. More specifically, nowadays, a state that satisfies most of its energy needs through renewable energy sources and is self-sufficient can be considered powerful in its region or even globally. By doing so, it becomes immune to oil and gas crises, and disputes over energy resources do not affect its electricity supply. Essentially, that state is protected from the power play of energy exporters, the volatility of supply and demand, and market failures. It is important to understand that the relationship between energy exporters and importers can either be mutually beneficial or not.

[39] (Klare, Resource Wars: The New Landscape of Global Conflict, 2001)
[40] (PRONISKA, 2007)
[41] (Paravantis, 2019)
[42] (Cherp, 2014)
[43] (Roman Vakulchuk, Renewable energy and geopolitics: A review, 2020)

Exporters want to sell their energy, while importers want to buy it, and both hold power over the other. However, if someone changes the terms of this relationship, such as the price or supply quantity, the balance can easily be disrupted. This relationship is very fragile, and its balance always hangs by a thread. Thus, a state that relies on its own sources of renewable energy and stays out of geopolitical power struggles is completely immune to geopolitical threats and imbalances.

PART II- The Need for Energy Transition

1. Resource Wars

As it has already been mentioned in the previous part, the energy sector in global power dynamics is crucial. Changes in the world's energy patterns have significant impacts on international politics and the study of energy geopolitics. Energy resources play a critical role in maintaining a state's military power, economic prosperity, and social stability, all of which are crucial to its survival. Therefore, the acquisition of energy sources can potentially create antagonistic relations among states. The peak oil theory, which states that fossil fuels, fueling approximately 80.9% of the total primary energy supply (IEA, 2019),[44]are finite, further reinforces this dispute. Essentially, fossil fuels producers-exporters by manipulating oil and natural gas prices and flow, try to weaponize energy and manipulate other nations' political agendas. Additionally, it has been observed that states abundant in fossil fuels suffer from disputes and war and also other states trying to intervene in their policies and control the abundant energy sources, adding a reason that the energy sector is directly linked to national security.[45]Two indicative examples of these are: First the war-like state of the Middle East Region. Second, the ongoing Energy Crisis since 2021, an aftermath of the Covid -19 lockdowns and reinforced by the Russian attack on Ukraine in February 2022.

Resource wars that occurred in the past were mainly linked to the fight for acquiring fossil fuels, particularly oil. In that case, oil plays a significant causal role.[46]Since the beginning of the new century, the concept of resource wars has become more diversified, with multifactorial reasons contributing to this phenomenon. Specifically, the end of the bipolar international system, characterized by the rivalry between the United States and the Soviet Union during the Cold War, shifted the global power balance towards a multipolar framework. The void left by the bipolar system allowed other countries to develop, strengthen their positions, and gradually consolidate their standing in the international system. These are known as rising powers, and they include India, Brazil, Russia and China. These countries' growth has also increased competition for raw materials and fossil fuels.
For example, due to China's rise, which lacks many of the resources it requires, such as oil, gas, timber, and most minerals, has already ventured out into the world to get what it desires. Oil has been the most visible of the required resources. Indeed, Chinese state-owned oil companies have projects in Africa, Central Asia, and the Persian Gulf aimed at exporting oil back to China.[47] As the country pushes others aside, violent conflicts may

[44] (IEA, World Energy Balances: Overview, 2019)
[45] (Wilson, 2018)
[46] (Klare, Blood and Oil: The Dangers and Consequences of America's Growing Dependency on Imported Petroleum (American Empire Project), 2004)
[47] (Wilson, 2018)

erupt. Another potential path to resource wars begins with all the money that is now flowing into poorly governed but resource-rich countries. The countries of the Middle East are an indicative example of this statement. Money may be used to fund civil wars and other hostilities, and it can even end up in the hands of terrorists**.** Moreover, another factor in resource wars is global climate change, which has the potential to exacerbate stress on natural resources, spark water wars, accelerate disease spread, and cause mass migrations.[48]

2. The Middle East Region Example

The Middle East is experiencing highly volatile and precarious conditions, demonstrating how the global economy's reliance on fossil fuels leads to conflict and vulnerability not only for importers but also for energy producers and exporters. Moreover, a consistent theme runs through all these conflicts: the world's abundance of energy resources. The United States, a superpower seeking to maintain its status, is frequently engaged with Middle Eastern issues to control the region's vast oil resources.[49]Certainly, the containment of Russia's emerging might is another possible justification for American involvement in the Middle East. The ghosts of the past and the Cold War specifically, are still present. Furthermore, the MENA (Middle East and North Africa) region is one of the world's most vulnerable to climate change.[50]It is warming faster than the global average, with two countries: Egypt and Yemen facing high or extremely high heatwave risks.[51]Below, further details regarding the Middle East will be provided.

The Middle East and North African region, commonly known as MENA, is composed of more than 20 states and is rich in natural resources. Historically, it was considered to range from Iran in southwest Asia to Morocco in northwest Africa. Over the years, studies have found that the local population is particularly prone to poverty. The poverty rates in MENA increase, even more, when additional indicators of poverty are considered, such as a lack of education, poor health, low quality of life, and violence rates.[52] Nearly 40% of the region's population, or over 116.1 million people, live in poverty, according to the

[48] (Victor, 2007)
[49] (Ali, 1990)
[50] (CRS, 2022)
[51] (Middle East and North Africa, 2022)
[52] (Davoodi, 2003)

2017 Arab Multidimensional Poverty Report.[53]According to the Joint Arab Economic Report of 2015, the Middle East and North Africa possess significant fossil fuel resources, including around 55.2% of the world's oil reserves and 27.5% of the world's natural gas reserves.[54] It is critical to highlight the profound impact these regions have had on civilization since ancient times. The Egyptian, Greek, and Persian empires were all based in the region, and it was regarded as the birthplace of civilization. Due to its advantageous geostrategic and geopolitical location and vast natural resource riches, the region has been colonized by Western countries.[55]It has been the center of war, internal turmoil, social injustice, and poverty even after the colonial era ended. Even to this day, these territories still bear the scars of their former colonialism. They continue to have difficulty establishing and sustaining solid democratic regimes. The Middle East Region is acknowledged to have the worst levels of inequality in the world, the top 1% of earners held 23% of the total income in 2019.[56]

The Arab Spring events of 2010 serve as a pivotal illustration of the political and economic conditions in MENA countries. Poor living conditions led to a wave of protests and rallies known as the "Arab Spring" in December 2010, which unquestionably changed the course of recent MENA history.[57]The authoritarian leader of Tunisia, Zine El Adibine Ben Ali, fled the country and entered Saudi Arabia shortly after the riots against him broke out in December 2010. The riots started when a peddler set himself on fire in front of the office of a government official who had gone there to complain after the police had obtained his belongings. Up to the establishment of a government of national unity, protests persisted. This phenomenon spread throughout the rest of the Arab world as a result of the revolution in Tunisia and the successful end of the uprisings, drastically shifting the balance of power in the region. Other uprisings quickly followed in Egypt, Libya, Bahrain, Syria, and Yemen, as well as protests in countries including Iraq, Jordan, and Morocco. The economic, social, cultural, religious, and environmental problems of the Arab world, together with the authoritarian governments that governed much of the region, were the root causes of these uprisings. As a result of their repression, the people's demands for equality, freedom, and justice were voiced. The high inequality rates of the Region remain to this day.[58]This situation describes the paradox of countries with a significant number of resources, especially oil. This phenomenon is known as the resource curse and it describes the paradox of a country that despite having valuable natural resources, a

[53] (UN, Arab Multidimensional Poverty Report, 2017)
[54] (Sheikh, 2022)
[55] (Sheikh, 2022)
[56] (Moshrif, 2020)
[57] (OECD, 2011)
[58] (Britannica E. , 2023)

country's economy underperforms.[59]A resource curse is typically caused by a concentration of the country's capital and labor force in a few resource-dependent industries. It could also be the result of government corruption. An overabundance of labor and capital flowing into just a few sectors may weaken the rest of the economy and harm the country. Overall, the resource curse emphasizes the difficulties that countries with abundant natural resources face in managing their economies and ensuring that the benefits of their resources are distributed widely and sustainably.[60]Furthermore, these countries' reliance on oil exports can expose them to fluctuations in global oil prices, as well as environmental risks and the challenges of transitioning to a low-carbon economy. While some Middle Eastern countries, such as Saudi Arabia, have been able to leverage their natural resources to achieve significant economic development, others, despite their resource wealth, have struggled with a variety of economic, social, and political challenges.[61]

3. Energy Security in 2022

The Ukrainian- Russian War is a recent example of energy being utilized as a coercive tactic in the International System. The European Union's (EU) main source of natural gas imports is Russia. According to Eurostat, Russia supplied 46% of the EU's natural gas imports in 2020 and was the most imported fuel from Russia.[62]The statement that Russia is the biggest gas provider for the EU- has a dual significance. First, by ensuring a steady supply of natural gas from Russia, the European Union is energy secured, and second, Russia obtains energy security since the EU remains its biggest "customer". The European Union has implemented sanctions against Russia ever since the war against Ukraine began. Russia simultaneously makes attempts to halt the delivery of natural gas into the EU.[63]This situation reinforced the existing global energy crisis that was born after the liberation of demand for fossil fuels, since the end of the global COVID-19 lockdowns in 2021.[64]Undoubtedly, the European Union must promptly pursue the diversification of its energy mix. However, accomplishing this objective necessitates thorough and well-coordinated advance planning. The replacement of Russian gas involves a significant

[59] (Frankel, 2012)
[60] (Reader, 2015)
[61] (Fernando, 2022)
[62] (Eurostat, The EU imported 58% of its energy in 2020, 2022)
[63] (Council, 2023)
[64] (IEA, Global Energy Crisis, 2023)

supply of American LNG.[65] The energy transition to stop energy dependence is not an option but a necessity.[66]

Transitioning to renewable energy sources serves as a notable demonstration of actively pursuing an energy transition. The use of renewable energy has proven to be the most environmentally friendly method,[67] allowing nations to become self-sufficient while promoting peace since it is an inexhaustible source. In contrast to nuclear or gas infrastructure, the infrastructure for renewable energy is relatively less expensive.[68]States with a significant proportion of renewable energy sources are not susceptible to the threat of running out of energy and are immune to foreign coercion. Despite the advantages of renewable energy sources, most countries still rely on traditional forms of energy such as gas and oil imports from unreliable exporters who may use energy exports as a weapon for national gains. This reliance on traditional energy forms persists even though renewable energy sources have immense potential to contribute to the global energy mix. The challenges arise from the well-established and efficient traditional energy infrastructure and technology, leading to difficulties and high costs associated with transitioning to newer technologies. Furthermore, some countries are influenced by political and economic factors that make transitioning to renewable energy sources difficult, such as strong ties to the fossil fuel industry or reliance on foreign oil for energy needs. Despite these obstacles, there is growing recognition of the significance of shifting to renewable energy sources.

Summing up, energy transition to renewable energy sources means immunity to power extortion by exporters, drastic changes in supply and demand, and market failures. We should consider whether an exporter-importer relationship can be mutually beneficial or not. Exporters want to export/sell, importers want to import/buy; they both have power over the other. If any aspect of these relationships (price, supply quantity, etc.) shifts, the relationship balance is destroyed. A country that relies on its renewable energy sources and avoids (geo)political power games is immune to geopolitical threats and imbalances entirely. Investing in renewables equals a powerful, independent nation.

[65] (Leggett, 2022)
[66] (FuelCellsWorks, 2019)
[67] (UN, Climate Action, n.d.)
[68] (Matthews, 2022)

4. Peak Oil

The Peak Oil theory serves as an additional illustration of the disruption that arises from the utilization of fossil fuels and fossil fuels dependence in relation to national security and international relations. Despite having powered Western civilization since the Industrial Revolution, fossil fuels are non-renewable energy sources. This implies that the rate of discovery of new fossil fuel resources is lower compared to the rate at which they are consumed to meet energy demands. The peak oil theory explains this phenomenon. Specifically, the peak oil theory indicates that the world's oil production will eventually reach a peak, after which it will begin to decline. This theory contends that oil is finite and that as we consume more of it, extraction becomes more difficult and expensive. According to the theory, the decline in oil production could have serious economic and geopolitical ramifications, such as rising energy prices, increased competition for resources, and potential conflicts over access to remaining reserves. Some proponents of the peak oil theory contend that it has already occurred or will occur soon, while others contend that new technologies and discoveries may delay or even prevent the peak from occurring.[69]

The Peak Oil theory has been addressed on numerous occasions, but it is mainly linked to M. King Hubbert, a geologist who worked for Shell Oil Company in the 1940s and 1950s. Hubbert came out with an essay titled "Nuclear Energy and the Fossil Fuels" in 1956, in which he predicted that US oil production would peak around 1970 and then decline steadily. Yet, it is noteworthy that throughout the history of the oil industry, different people and groups have brought up concerns about the finite nature of fossil fuel resources and the possibility of resource depletion. Hubbert's work, on the other hand, stood out for the rigor and accuracy of its predictions, which were based on detailed analyses of production data and geological factors.[70]

Peak Oil applies to other fossil fuels as well, such as coal and natural gas. Peak coal refers to the point in time when global coal production will reach its peak, after which production will decline due to the depletion of accessible coal reserves or deterioration of the remaining coal's quality. Peak gas, on the other hand, refers to the point in time when global natural gas production will reach its peak, after which production will decline

[69] (O'Leary, 2022)
[70] (O'Leary, 2022)

due to the depletion of accessible natural gas reserves. However, the timing and specifics of peak coal and peak gas are still being debated and are subject to uncertainty.

To address the challenges posed by Peak Oil and other fossil fuel depletion, policymakers have several options. Investing in renewable energy is the primary solution currently: Policymakers can encourage the development and deployment of renewable energy that is sustainable and does not deplete over time. Promoting energy efficiency can also help reduce the demand for fossil fuels. Appliance efficiency standards and public transportation can also help reduce energy consumption. Furthermore, implementing market-based mechanisms is an effective solution. Policies such as carbon taxes, cap-and-trade systems, and other market-based mechanisms can provide economic incentives to reduce demand for fossil fuels [71]while also spurring innovation in alternative energy technologies like the European Union has implemented since 2005 with the Emissions Trading System (ETS) an explicit carbon pricing instrument that limits or caps the allowed amount of GHG emissions while allowing market forces to reveal the carbon price through emitters trading emissions allowances. [72]The Union's ETS is the world's first international emissions trading system, inspiring emission trading programs that have been implemented in 35 countries, including 28 in the EU.[73]The cap is gradually reduced each year, ensuring that the European Union's 2030 emission reduction target of 55% relative to 1990 can be met while remaining climate-neutral by 2050.[74]

To sum up, addressing the challenges posed by fossil fuel depletion requires a holistic plan that encompasses both supply and demand considerations, fosters innovation and investment, and prioritizes sustainability and efficiency in energy production and consumption. Furthermore, given that everyday life and state operations have relied on fossil fuels for many years, supporting research and development is crucial to mitigate the effects of the transition and enhance the future diversification of national energy mixes. Therefore, the energy transition represents an inevitable policy change those states are destined to undergo sooner or later. The significant impact of the energy crisis is its accelerating pace, which compels us to confront this inevitable transition. In addition to the technical factors that will make fossil fuel extraction increasingly challenging, the realization of the severe environmental consequences stemming from the persistent use of fossil fuels since the industrial revolution serves as a powerful reminder.

[71] (Carbon Pricing, n.d.)
[72] (EU Emissions Trading System (EU ETS), n.d.)
[73] (EU Emissions Trading System (EU ETS), n.d.)
[74] (Commission, 2030 Climate Target Plan, n.d.)

5. Climate Change

Each period of recent history has been characterized by the predominance of a single energy source or a combination of sources considered essential and influential for human civilization and technological development. For instance, the shift from steam to coal marked the onset of the Industrial Revolution,[75]while the transition from coal to oil, and subsequently from oil to gas, brought about significant changes in the world's economic, social, and political landscapes.

During this transition period, one notable change was the shift in people's behavior due to the availability of cheap and abundant energy. This led to the increased use of energy-intensive appliances and higher overall energy consumption.[76]However, the use of fossil fuels has also resulted in environmental issues, such as air pollution and the depletion of natural resources.

Furthermore, the heavy reliance of many nations on oil and gas imports has resulted in geopolitical disputes and tensions over access to these resources, highlighting how certain countries can manipulate the fossil fuel market and how damaging is energy dependence.[77]

As time progresses, human energy needs continue to intensify. As previously stated, the transition from coal to oil and gas altered human consumption habits, resulting in a lack of environmental consciousness, excessive energy use and in a severe environmental impact.[78]Therefore, the quality of life in industrialized societies is heavily dependent on electricity consumption and overall energy use, which is supported by the rapid advancement of technology and consumerist tendencies in recent decades. It can be argued that daily life has been and will continue to be, heavily influenced and defined using energy and electricity, particularly in developed regions of the world. However, the question remains: what is the cost of this heavy reliance on energy consumption and specifically fossil fuels?

The answer lies in the concept of climate change. The combustion of fossil fuels for energy production releases greenhouse gases like carbon dioxide and methane into the atmosphere, which subsequently accumulate and contribute to the phenomenon of global warming and climate change. The continued escalation of energy and electricity consumption further compounds this issue, exacerbating the emission of these gases and intensifying the associated impacts. More specifically, before the Industrial Revolution,

[75] (Wilkinson, 2022)
[76] (Turner, n.d.)
[77] (Wilson, 2018)
[78] (Turner, n.d.)

the average global concentration of carbon dioxide was around 280 parts per million (ppm). Presently, that level has risen significantly and is nearing 420 ppm. Each additional tone of CO2 emissions contributes to the warming of the planet.[79]Carbon dioxide levels on our planet were as high as they are today more than 4 million years ago. Sea levels were between 5 and 25 meters higher than they are today, enough to drown many of the world's largest modern cities[80]and this process has occurred relatively quickly. The annual rate of increase in atmospheric CO2 was about 100 times faster than previous natural increases in just 60 years or so. This strongly suggests that increasing anthropogenic greenhouse gas emissions will result in drastic changes in weather patterns, habitation, and biodiversity. Due to global warming, many of the world's ecosystems are already on the verge of catastrophic and potentially irreversible changes, such as the rising sea levels, the more frequent and intensified occurrence of natural disasters, the degradation of biodiversity, as well as threats to human health and well-being. These issues can be understood through the theory of Climate Tipping Points.[81]

Climate tipping points are conditions beyond which changes in a part of the climate system become self-perpetuating. These changes may have abrupt, irreversible, and dangerous consequences for humanity. Armstrong McKay et al. provide an updated assessment of the most important climate tipping elements and their potential tipping points, including temperature thresholds, time scales, and impacts. Their analysis shows that even 1°C global warming, which we have already passed, puts us at risk by triggering some tipping points. Triggering CTPs (climate tipping points) has significant policy implications, including significant sea level rise from collapsing ice sheets, dieback of biodiverse biomes like the Amazon rainforest or warm-water corals, and carbon release from thawing permafrost.[82]
Therefore, it is imperative to devise sustainable solutions to fulfill our energy needs while simultaneously reducing our carbon footprint and mitigating the adverse effects of climate change.

The Intergovernmental Panel on Climate Change (IPCC) predicts that a 1.5°C or higher increase in temperature above preindustrial levels will have significant and possibly permanent effects on the planet. In particular, the IPCC assessed the potential impacts of a 1.5°C temperature increase and concluded that it would have significant effects on ecosystems, human health, and well-being.[83] This includes increased frequency and severity of natural disasters such as droughts, floods, storms, and wildfires, as well as an increased risk of food and water scarcity, biodiversity loss, and human displacement. Climate change will disproportionately affect vulnerable communities, including those in low-lying coastal areas, arid and semi-arid regions, and small island developing states. As

[79] (IGINI, 2022)
[80] (Stein, 2022)
[81] (IGINI, 2022)
[82] (Armstrong McKay et al, 2022)
[83] (ipcc, 2022)

a result, the global community must act quickly to mitigate the effects of climate change and work toward a more sustainable future.[84]

Human impact on the environment is developing because of the mass production of technical products, intensification of agriculture, fast urbanization, and rising demand for fossil fuels for energy and transportation. The good news is that because of their commitment to the Kyoto Protocol and the Paris Agreement, industrialized nations have already made a significant shift toward green growth, which is aided by extensive public access to environmental information. To meet the Paris Agreement, aim of limiting temperature rise to 1.5 degrees Celsius over pre-industrial levels, there is a need for greater penetration of renewable energy sources. As a result, in the framework of implementing sustainable development, green investments in the energy sector have greatly evolved, particularly in recent years.[85]

For an extended period of time, scientific research and public concern have been focused on climate change and its potential impacts on the environment and human society. The scientific consensus on the reality and severity of climate change has been growing since the 1980s decade when the United Nations established the Intergovernmental Panel on Climate Change (IPCC) in 1988.[86] Concerns about the potential effects of human activity on the Earth's climate and environment, on the other hand, date back at least to the mid-twentieth century, when scientific studies began to suggest that increased carbon dioxide emissions from the combustion of fossil fuels could contribute to global warming.[87]

From the 1990s decade onward, states have been signing treaties as evidence that they acknowledge the need for coordinated action against climate change. The Kyoto Protocol is a prime example of such an agreement. The Kyoto Protocol was adopted on December 11th, 1997, and there are 192 Parties as of today. In a nutshell, the Kyoto Protocol operationalizes the United Nations Framework Convention on Climate Change by obligating developed nations and economies in transition to set and adhere to individual emission reduction targets for greenhouse gases (GHG).[88]This indicates that countries are aware that the use of fossil fuels, which has been the driving force that has propelled Western civilization has already reached its zenith. As Renewable Energy Sources (RES) become more prevalent in our lives, they are ushering in a new era in the energy sector.

Interestingly, the regular promotion of green initiatives seems to be sparked by severe socio-economic crises. The green economy has lately emerged as a political response to predictions of protracted economic difficulties in the hypothetical wake of the Covid-19 pandemic, even though it might be argued that it is a continuation of many largely

[84] (Allen, 2018)
[85] (Ntanos et al, 2018)
[86] (IPCC, 2022)
[87] (UCAR, n.d.)
[88] (UN, What is the Kyoto Protocol?, n.d.)

unfulfilled promises dating to the worldwide 2008 financial meltdown. Rebuilding society after a crisis is once again a top priority for the state in the medium term.[89]The way out of an ill-fated society will be through the creation of renewable energy, which will create employment and provide power to underserved communities. The turn to a sustainable green future has been used as medicine.

6. Water Scarcity

“Water is the reason of our birth; it is the healer, the destroyer and the final consumer.”
— **Neeraj Singhvi**

Water Scarcity is one of the most severe impacts of climate change. Water scarcity is becoming more of a problem on every continent, with poorer communities bearing the brunt of the burden. [90]The amount of water that can be physically accessed varies according to supply and demand. Water scarcity worsens as demand rises and water supply suffers from a decrease in quantity or quality. Water is a limited resource with increasing demand. Also, many countries' water resources and infrastructure are failing to meet demand because of global population growth and resource-intensive economic development continues. Freshwater accounts for 3% of the world's water supply. 2.5% of the world's fresh water is either locked up in glaciers, polar ice caps, the atmosphere, and soil; highly polluted; or lies too far beneath the earth's surface to be extracted at a reasonable cost. Fresh water accounts for 0.5% of the world's water supply.[91]Sustainable development meets people's needs today while not depleting resources for future generations. Consequently, the United Nations adopted seventeen "Sustainable Development Goals" in 2015 as a global plan to end extreme poverty, reduce inequality, and protect the environment by 2030 and Goal 6 focuses on ensuring that everyone has access to a sustainable clean water supply and adequate water sanitation.

The United Nations (UN) also discusses five major reasons why safe and clean water is essential for communities to thrive physically, mentally, economically, socially, and spiritually. First, for development that is both sustainable and long-term, second socioeconomic advancement, third food and energy production. Moreover, clean water is vital for survival and health, and for ecosystems in optimal condition. Fresh water is also crucial: is the beginning of all life on earth and without it no life can exist. Even The human brain is composed of about 75% water.[92]

[89] (Knight, 2021)
[90] (UN, Water Scarcity, n.d.)
[91] (USBR, 2020)
[92] (Media, 2022)

Above all, water and energy are inextricably linked. Water is required in the production processes of all energy sources (including electricity): the extraction of raw materials, cooling in thermal processes, cleaning processes, crop cultivation for biofuels, and powering turbines.[93] Natural gas and synthetic fuels produced by coal gasification are the most water-efficient energy sources, according to a study. Fuel ethanol and biodiesel are the least water-efficient energy sources. Younos and Hill discovered that geothermal and hydroelectric energy types use the least amount of water, while nuclear plants use the most.[94]

Concluding, water scarcity is one of the many impacts of climate change. Water scarcity is becoming more of a problem on every continent, with poorer communities suffering the heaviest impact.[95]The amount of water that can be physically accessed varies according to supply and demand. Water scarcity worsens as demand rises and water supply suffers from a decrease in quantity or quality.
The United Nations recognizes that water disputes arise from competing public and private water users' interests. Water conflicts have occurred throughout history, but traditional wars are rarely fought solely over water. The emergence of water scarcity may lead to a new era of conflict centered around the acquisition and control of freshwater resources.[96]

As previously stated, developed as well as developing nations recognize the importance of natural and fossil fuel resources in sustaining daily life. Additionally, there is a clear importance of assisting nations in developing to improve their standard of living and authority. Since the Industrial Revolution, fossil fuels have taken on an important role in every major era of industrial development.[97]Particularly, coal was the most desired good before being replaced by oil during WWII, and then oil after the Oil Crises was merely replaced by natural gas. The recent attempt by Russia, the world's largest producer of natural gas and European Unions' biggest exporter, to weaponize gas to extort the European Union partners into not assisting Ukraine[98]has accelerated what the catastrophic effects of climate change had already begun, the energy transition toward more sustainable energy sources. It also proved the catastrophic effects of natural gas dependence. However, one critical aspect of climate change that often goes overlooked is water scarcity. The evolution of human civilization has come full circle, with a vision of returning to cleanliness and living in harmony with nature in a pristine environment.

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[93] (UN, Water and Energy, n.d.)
[94] (Tech, 2008)
[95] (UN, Water Scarcity, n.d.)
[96] (UN, Conflicts over water will become more common without science-based water diplomacy, panel tells UN General Assembly, 2023)
[97] (Turner, n.d.)
[98] (Lawson, 2022)

7. Renewable Energy Sources

Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed.[99] Renewable energy sources (RES) are produced naturally in all their forms by the sun, wind, rain, ocean tides, biomass, and geothermal resources, which get their heat from the earth's interior. Interestingly humans discovered that they could use the power of nature for energy purposes many years ago. Specifically, they learned that sails could be used to capture wind energy for transportation around 8,000 years ago. Later, wind energy was used once more, this time to power the first "wind farm," which consisted of windmills powering water wheels to grind grain.[100] The proper technology for using renewable energy sources successfully has been developed the past years as more and more nations opt for renewable energy options.

In general, renewable energy is generated from a sustainable and natural source. It replenishes over time, allowing for ongoing usage, though it is occasionally "flow-limited." Renewable energy sources produce cleaner energy and have a significantly less carbon footprint than fossil fuels.[101]Furthermore, renewable energy sources have the potential to reduce global greenhouse gas emissions by up to 70% by 2050 compared to current levels, according to the United Nations Intergovernmental Panel on Climate Change (IPCC). [102]

Recently renewable energy sources have been some of the most competitive and cheap energy sources available. According to the International Energy Agency (IEA), solar power is now the cheapest source of electricity in history, and the costs of solar and wind power have reached all-time lows. The technological advances that have reduced installation, operation, and maintenance expenses are largely the reason for the price decrease.[103] According to IRENA, the global weighted-average cost of electricity from solar photovoltaic (PV) systems has dropped by 88% since 2010, making it competitive with fossil fuels in many regions. Wind energy costs have also been falling rapidly in recent years, thanks to technological advancements and lower financing costs. Wind energy

[99] (UN, What is Renewable Energy, n.d.)
[100] (Energy A. , n.d.)
[101] (SOWDEN, 2022)
[102] (IPCC, 2022)
[103] (Evans, 2020)

prices fell by 68% between 2010 and 2021, with onshore wind falling by 68%, CSP falling by 68%, and offshore wind falling by 60%.[104]

Renewable Energy Sources offer numerous advantages, but they also have some drawbacks, as do all other forms of energy. Thus, in the case of renewable energy, the distribution of natural resources, which is based on geographic location, and energy usage, which is dependent on the culture of each unique society, are the two main reasons why renewable energy cannot be adapted to every community. It would be incorrect to say that each community does not have a unique mix of renewable energy sources that suit their needs and can be successfully utilized. [105]Running entirely on renewable energy has the major drawback of being largely intermittent. The two primary sources of renewable energy are the sun, which only shines during the day, and the wind, which does not always blow. Due to their interference with the established procedures for preparing the daily operation of the electric grid, intermittent renewables present a challenge.[106]As a result, people should use a Renewable Energy Source model that employs a viable res combination. A combination of two or more different renewable energy sources could solve this problem.

Those conclude the main disadvantages and advantages of renewable energy sources. Bellow I am also going to present the most widely used renewable energy sources of the European Union members in 2020, according to Eurostat, as well as their own main advantages and disadvantages.

8. Solar

The most prevalent renewable energy resource on the planet is solar energy. Indeed, solar energy is the most abundant of all energy resources and can even be used in cloudy conditions. [107]The rate at which solar energy is intercepted by the Earth is approximately 10,000 times greater than the rate at which humanity consumes energy. Despite this abundance, just 0.04 percent of the basic energy used globally is generated directly by the sun.[108]Although it is highly effective and efficient, by utilizing thermal storage, it can generate a consistent source of energy.

[104] (IRENA, 2022)
[105] (Mohtasham, 2015)
[106] (Fares, 2015)
[107] (UN, What is Renewable Energy, n.d.)
[108] (UN, What is Renewable Energy, n.d.)

In theory, mankind harnessed solar energy as early as the 7th century B.C., when historians claim that people used sunlight to light fires with magnifying glass materials. Later, during the third century B.C., the Greeks and Romans were known to use mirrors to harness solar power to light torches for religious ceremonies. Later around 20 A.D., the Chinese civilization documented the use of mirrors for the same reason. Another early application of solar energy that is still widely used today is the idea of "sunrooms" in buildings. Massive windows were employed in these sunrooms to funnel sunshine into a narrow area. The Roman Empire made extensive use of this idea.[109]

Solar has been the costliest sustainable energy option. However, in the past decade costs have been dropping. According to a report by the International Renewable Energy Agency (IRENA), the global weighted average cost of electricity from utility-scale solar photovoltaic (PV) power (the PV materials and devices convert that sunlight into electrical energy)[110]has decreased by 82% between 2010 and 2020. Moreover, compared to fossil fuels, solar energy has a far lower environmental effect. Since the technique does not require any fuel burning, during the generation process, solar power emits no emissions.[111]

Also, photovoltaic (PV) solar, cells do not use any water for producing power. Solar panels PV may be installed on private homes as well, supplying electricity that is separate from a broader electrical grid, making them the most accessible Renewable Energy Source solution for homeowners.[112] In contrast to other renewable energy sources like wind and hydroelectric power, residential-sized solar energy systems also have a relatively low environmental effect.[113]Also, solar panels require minimal maintenance**.**

Every energy- producing option has drawbacks. The fact that electricity can only be produced when the sun is shining is one of the main disadvantages of solar energy technology. This means that the supply may be interrupted, for example, at night. If there were inexpensive means to store energy,[114] the shortfall caused by this interruption would not be a concern, because highly sunny times can provide extra capacity. Countries leaders in solar energy technology, like Japan, are concentrating on creating appropriate energy storage to address this issue as the demand for solar energy increases globally. In central Honshu, Japan, the first floating solar power plant in history was constructed. Numerous small-scale plants assist in the region's transition to distributed local power

[109] (RICHARDSON., 2022)
[110] (SOLAR ENERGY TECHNOLOGIES OFFICE, n.d.)
[111] (Resch, 2007)
[112] (Commission, EU Solar Energy Strategy, 2022)
[113] (Mohtasham, 2015)
[114] (Mohtasham, 2015)

generation, which has been identified by the World Economic Forum as the key to revolutionizing the global power supply.[115]

Another disadvantage of using solar energy is its high cost, but as previously stated, this disadvantage has been mitigated over the last decade. As a result, the cost of solar energy storage varies depending on a number of factors, including battery technology, system capacity, and location. The cost of solar energy storage, on the other hand, has been declining in recent years.

According to the International Renewable Energy Agency (IRENA), the cost of lithium-ion battery storage systems has decreased by approximately 87% over the last decade. (There are two popular solar battery types: lead-acid and lithium-ion. Solar panel manufacturers prefer lithium-ion batteries because they have a higher Depth of Discharge and can store more energy than other batteries). [116] Solar energy storage systems are now more cost competitive with traditional fossil fuel power plants, allowing solar power to become a more reliable source of energy. Costs for solar energy storage are expected to fall further as battery technology improves, economies of scale are realized, and more businesses invest in energy storage solutions. Thus, solar energy storage is important, as is the cost of purchasing solar panels, but it reduces the cost of electricity bills and the environmental footprint in the long run.

9. Wind

Wind energy is, like solar, an energy source that can be traced back to ancient times. Wind energy was initially utilized to drive boats along the Nile River as early as 5,000 BC. Windmills with woven-reed blades were milling grain in Persia and the Middle East by 200 BC. Wind energy innovations ultimately spread around the world. By the 11th century, people in the Middle East began making substantial use of wind pumps and windmills for food production.[117] Eventually wind, along with solar energy, has played and will continue to play a significant role in setting the stage for a future powered by sustainable energy. First and foremost, unlike fossil fuels, which slowly replenish, it is a clean, renewable energy source that does not release pollutants into the air. Wind turbines have a relatively low environmental impact and after they have been installed, they emit zero emissions. Due to their enormous size and weight, wind turbines require a lot of land and heavy

[115] (Broom, 2019)
[116] (Palmetto, n.d.)
[117] (EIA, 2023)

machinery to be built. However, once the turbine is operating, most of this possible disturbance can be minimized and fixed. It has a low running cost and does not require much maintenance. It can make good use of the land. As a result, the economic impact of the wind energy operation is minimal.[118]

Unfortunately, wind energy, like solar, is an intermittent energy source, generating electricity sporadically, when the wind blows, as opposed to on demand. Even so, a sizable turbine may generate a lot of energy annually. In fact, in just under 100 minutes of operation, even a wind turbine of ordinary size may generate enough electricity to run a home for an entire month.[119]The cost- effectiveness of wind energy is another key advantage. Although installing wind turbines can be expensive, their cheap operating and maintenance expenses quickly offset that initial outlay. The levelized cost of energy (LCOE) of wind is lower than that of many other renewable energy sources and much lower than that of coal and gas, which helps to reduce the cost of electricity for locals. The price of wind is decreasing as technology advances. Onshore wind costs have decreased by 27% since 2013 and this trend is expected to continue. Turbines are therefore an effective use of land.[120]Essentially, the fact that wind energy is an intermittent source like solar energy and has no storage capacity just yet, the main drawbacks concern problems that might come up with bad inconsistent planning beforehand. Nevertheless, energy storage technology is developing and becoming more affordable, so it qualifies as a solid option for the transition to sustainable energy, especially if combined with solar energy solutions.

10. Hydropower

Hydropower, or hydroelectric power describes the process that takes place when rivers and water flow naturally through hydroelectric power plants, which exploit that flow to produce energy.[121] Many nations prioritize the development of hydropower due to its economic, technological, and environmental advantages. For instance, China boasts the world's richest hydro resources, with a 694GW theoretical hydropower potential.[122] Also, in Norway, renewable hydropower sources produce about 96% of the nation's

[118] (Energy, Perch, 2023)
[119] (Energy, Perch, 2023)
[120] (Energy, Perch, 2023)
[121] (National Geographic Society, 2023)
[122] (Mohtasham, 2015)

electricity.[123]Hydropower development is crucial for addressing the energy problem and environmental degradation.

Interestingly, more than 2,000 years ago, the ancient Greeks utilized it to turn water wheels for grinding wheat into flour. Mechanical hydropower was widely employed for milling and pumping in the 1700s. By the early 1900s, hydroelectric power accounted for more than 40% of the United States electrical supply.[124]

Hydropower, as a renewable energy source, has numerous advantages over conventional energy sources. Using water to produce electricity does not emit harmful pollutants into the air or water, in contrast to conventional fossil fuel energy sources. Even though the construction of big hydroelectric facilities like dams and reservoirs involves significant environmental concerns, once they are up and running, hydropower plants do not require burning any fossil fuels. Also, hydroelectricity is a 100% renewable source of electricity since hydroelectric facilities do not deplete water resources while they are in operation. Hydropower will always be a practical option to produce energy because of how the water cycle operates naturally.[125]

The vast majority of hydroelectric systems store or pump enormous volumes of water into reservoirs, where they may be used to generate power basically always. Because hydropower plants rely on water that has been stored in reservoirs, it is typically a stable source of energy in the sense that it may provide a steady supply of supplementary energy for interment energy sources like wind and solar. So, because many hydroelectric plants can produce energy on demand (by discharging stored water through turbines), they are dispatchable resources. These facilities include storage hydropower and pumped storage hydropower. Typically, many hydroelectric facilities are situated next to reservoirs that help the community by providing water, flood control, and recreational opportunities.[126]

Despite the fact that hydropower has high upfront costs, it has proven to be one of the least expensive renewable energy sources over time. Once the necessary infrastructure is built, hydropower requires less maintenance than other energy sources and is now undergoing modifications to increase its performance. Although hydropower is a sustainable energy source, there are certain significant environmental effects associated with the construction of hydroelectric facilities that should be taken into consideration. The natural flow of a river system is disrupted most significantly by storage hydropower or pumped storage hydropower plants. This results in altered animal migratory routes,

[123] (Business Norway, 2023)
[124] (Bureau of Reclamation, 2016)
[125] (Hydropower pros and cons, 2022)
[126] (Mohtasham, 2015)

poor water quality, and the relocation of people or wildlife. It is a trustworthy energy source, but weather and precipitation trends still have the last word. Droughts that result in reduced water flow have an influence on hydroelectric generating capacity since most of the hydropower generation uses river water. The amount of water that is available for hydropower systems can change from month to month and from year to year, which can affect how much energy is produced at a hydroelectric station.[127]

11. Biomass

Biomass is any type of organic material used to produce energy, often derived from plants and trees. After burning, methane is captured and converted into power. However, burning is not the only source of biomass energy.[128]The processes of combustion, gasification, and anaerobic digestion can all be used to transform biomass into different types of energy, such as heat, electricity, and biofuels. The largest biomass energy source available today is wood. Methane from landfills or other waste streams can be recovered for use in biomass energy.[129]Although methane from landfills or other waste streams can be recovered and used for energy, since it is not made from plant or tree materials, it is not regarded as biomass energy. It is usually classified as a form of biogas energy.[130] Biomass is most likely our first source of energy. People have been using wood to heat their houses and cook their food for thousands of years. The sun provides energy to biomass and all organic material contains sun-stored energy.[131]

Given that it is made of organic material that can be replenished over time, biomass is regarded as a renewable energy source. Biomass can be grown and harvested in a relatively short amount of time, unlike fossil fuels, which are limited resources that took millions of years to form and are being used up much more quickly than they can be replaced. All biomass derives its initial energy from the sun. As a result of photosynthesis, biomass resources regenerate more quickly than those of fossil fuels. As a result, we will not run out of biomass to employ in the creation of electricity. Additionally, biomass contributes to waste reduction. Since organic waste in landfills decomposes and releases methane, one of the most potent greenhouse gases, as well as carbon dioxide and other components, many things that wind up there are harmful and poisonous. By sending

[127] (Hydropower pros and cons, 2022)
[128] (Mohtasham, 2015)
[129] (Mohtasham, 2015)
[130] (IEA, Outlook for biogas and biomethane: Prospects for organic growth, 2020)
[131] (lsa.colorado, n.d.)

garbage to biomass energy plants instead of landfills, we may utilize materials that would otherwise hang around inefficiently and help shrink the number of landfills. Biomass energy facilities are frequently dispatchable, which means they may be easily turned on or off. As a result, electrical grid operators may use the energy from these plants when demand is at its highest. Contrary to other renewable energy sources like solar and wind, bioenergy is neither fluctuating nor intermittent. While some biomass resources may only be accessible during certain times of the year, biomass energy plants can always produce power, no matter what the weather is like.[132]

Similarly, to many other energy sources, biomass power production can have a variety of negative environmental effects. First, in addition to the initial costs of setting up the plants, there are additional expenses related to harvesting, transporting, and storing biomass before it is converted into power. Since they rely on free, onsite resources (tides, sunshine, wind, etc.) for fuel, other renewable technologies do not need to take this additional cost into consideration. However, even the most expensive forms of bioenergy are still comparable to or less expensive than fossil fuels: bioenergy does not need digging into the earth. Moreover, the locations where a plant may be installed are limited by the amount of space needed for biomass energy plants. The organic matter itself may require additional area to develop, increasing the amount of land required for each unit of power produced. Unsustainable bioenergy techniques can eventually lead to deforestation, depending on the type of biomass utilized to produce electricity. Additionally, the health of the surrounding soil, which depends on biomass for compost and fertilization, may also be impacted by the removal of plants and organic matter from the ground. Water is also necessary for growing crops only for bioenergy supplies because all plants require water to thrive. Moreover, although biomass is sometimes seen as a more ecologically benign alternative to coal, the process of turning it into power does produce air pollutants such as carbon dioxide, nitrogen oxides, volatile organic compounds, and others. As a result, the production and use of biomass as a source of renewable energy affect its sustainability. To ensure that biomass is used in a way that minimizes its environmental impact and supports long-term availability, it is crucial to adopt sustainable practices and policies.[133]

[132] (EnergySage, 2022)
[133] (EnergySage, 2022)

12. Conclusion on Renewable Energy Sources

Renewable forms of energy are currently considered the most environmentally friendly forms of energy capable of driving any nation to energy autonomy. It is also a calm approach to energy production because it never runs out and thus does not cause tension. Infrastructure is less expensive than other forms, such as nuclear or gas pipeline infrastructure. Also states that their energy mix, which includes a significant percentage of renewables, are more immune to foreign threats of energy shortages.[134]

Therefore, if renewables offer so many benefits, the question is why have most states been slow to transition to renewables, preferring to rely on traditional forms of energy like gas and oil imports from untrustworthy exporters who weaponize their exports rather than increasing the share of renewables in their energy mix? Consequently, what is the reason that traditional energy sources continue to account for the lion's share of global energy consumption?

First, any significant change can cause social unrest and political instability. This change will undoubtedly result in the extinction of some jobs associated with the extraction, transportation, and storage of oil and gas. Also, expect the world to experience a social swift of balance because of the energy shift.[135]However, a state that protects and supports those in more precarious and unfortunate situations, or a welfare state, has more social and economic benefits in the long run than the economic losses that may occur in the short run. Essentially, a welfare state must help those in need regardless of their circumstances, and this can only lead to benefits such as social-political stability and equality.[136]However, RES penetration will also create jobs in this industry.[137]

Within a process of change, there are losers and winners. This difficulty in moving forward may reflect the power that a major energy exporter wields over a nation importer with a high percentage of fossil fuels in its energy mix, not only as an energy exporter but also as a powerful policymaker in the affairs of other countries. When someone wields such power, we should consider how secure the international system is. One example is the OPEC oil crisis,[138] as is Russia's war in Ukraine and the ensuing Energy Crisis.[139]Switching

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[134] (UN, Climate Action, n.d.)
[135] (Kemp, 2020)
[136] ("welfare state", 2020)
[137] (UN, Climate Action, n.d.)
[138] (Danielsen, 2023)
[139] (Leggett, 2022)

to renewable energy sources (RES) is the solution. Self-sufficiency shifts power away from large exporters and toward smaller nations in the international system. Furthermore, the environmental disaster caused by the continued use of fossil fuels demonstrates that the only option is to transition to renewable energy sources.

PART III

1. The case of European Union's Energy Sector

The European Union is a unique blend of economic and political union among 27 countries, which was formed in response to the postwar impact in Europe,[140] with the aim of safeguarding the continent's peace, prosperity, and stability. Millions of civilians lost their lives in World War II, and the economy was in ruins, while security was severely lacking. Since the end of World War II, the European Union has been one of several attempts to integrate Europe. After the war, various Western European nations advocated for deeper economic, social, and political relations to achieve economic development and military security, and to promote long-term reconciliation between France and Germany.[141] The Treaty of Paris was the first official attempt to integrate the coal and steel sectors in Western Europe by establishing a common market for coal and steel.[142] It is believed that the deeper rationale behind the establishment of the ECSC was that, by jointly regulating the coal and steel community, whose main utility was to produce weapons, the possibility of another war would be reduced. Basically, Europe coming from a long period of war and conflict realized that energy-related material circulation in the European continent when controlled could really protect from a new conflict. The European Coal and Steel Community (ECSC) was established on April 18, 1951, after the signing of the Treaty of Paris by France, Italy, West Germany, Belgium, Luxembourg, and the Netherlands.[143]The idea of giving an independent authority responsibility over key areas of their economies was proposed by French Foreign Minister Robert Schuman, who suggested the creation of a common market for coal and steel in May 1950. French policymakers were driven to create what was known as the Schuman Plan by the conviction that a new economic and political framework was required to avert upcoming Franco-German hostilities and protect these countries from another war.[144] The construction of a "United States of Europe" that would dominate a major fraction of the European mineral and energy industry was the goal.

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[140] (Union, History of the European Union 1945-59, n.d.)
[141] (Union, Schuman declaration May 1950, n.d.)
[142] (Union, Schuman declaration May 1950, n.d.)
[143] (EUR-Lex, Treaty establishing the European Coal and Steel Community, ECSC Treaty, n.d.)
[144] (Union, Schuman declaration May 1950, n.d.)

Later, the European Coal and Steel Community (ECSC) was succeeded by the European Atomic Energy Community. One of the Treaties of Rome, the Euratom Treaty, which was signed on March 25th, 1957, aimed to create a single market for the expansion of atomic energy's peaceful applications. Belgium, France, West Germany, Italy, Luxembourg, the Netherlands, and other initial members were later joined by all current members of the European Union (EU). The intention to enable the construction of a nuclear energy sector on a European rather than a national scale was a key driver behind the foundation of Euratom.[145]The shock of the aftermath of the use of atomic energy in WWII was the underlying factor behind the initiation. Once again, the security and stability of the Community were the ultimate goal. Simultaneously, the European Economic Community (EEC) was born. By removing most trade restrictions and establishing a unified external trade strategy, the EEC was created with the goal of establishing a common market among its members. The agreement also established a single agriculture strategy, which was a major leap towards economic cooperation, besides the economic cooperation in the energy sector. Both Rome Treaties entered into force on January 1st, 1958.[146]

Since its inception, Euratom has shared a court of justice and a legislature with the European Economic Community and the European Coal and Steel Community. The executive bodies of all three communities - the Commission and the Council of Ministers - were united in July 1967. This Treaty is known as the Merger Treaty or Brussels Treaty. Ultimately, the EU absorbed Euratom, ECC, and ECSC in 1993.[147]

Although other sectors were emphasized only in the later years, the energy sector gained significant momentum in the 1970s due to the oil crisis of 1973-74 and later in 1980. These unprecedented events led to the realization that in order to address energy issues, Member States should set standards for both energy demand and supply, promoting the use of solid fuels, hydrocarbons, and nuclear energy in the Community and the usage of energy more rationally.

Prior to 1987, economic strategies were used to enable a common energy policy. When environmental protection was incorporated into the Single European Act in 1987, things changed. A new "Environment Title" was introduced by the Single European Act of 1987, granting the first legal framework for a common environment policy with the objectives of maintaining environmental quality, safeguarding human health, and ensuring the wise use of natural resources.[148]The Commission was unable to add a distinct energy chapter

[145] (EUR-Lex, Treaty establishing the European Atomic Energy Community (Euratom), n.d.)
[146] (EUR-Lex, Treaty of Rome (EEC), n.d.)
[147] (EUR-Lex, Treaty of Brussels (Merger Treaty), n.d.)
[148] (Parliament-Europa, Environment policy: general principles and basic framework, n.d.)

to the Treaty of Maastricht in 1992 because the emphasis remained on giving the internal market's completion a firm deadline.[149] A few Member States, particularly those with sizable reserves, blocked this plan because they did not want to cede their independence in that area. This is the reason why developing a unified energy strategy remains challenging. The directives on the internal markets for gas and electricity (1996 and 1998) were based on the progress that had been accomplished in the Treaties' internal market and environmental restrictions.

The energy sector was not of primary significance for the European Union until the Lisbon Treaty was signed in 2007 and came into force in 2009. The competencies of the Union, concerning the Energy and Environment Sector, were finally made clear in the Lisbon Treaty. It makes a distinction between three different categories of competence: exclusive competence, where only the Union has the authority to enact laws, and member states are only responsible for putting them into effect. Shared competence, where member states have the authority to enact laws and member states are only responsible for putting them into effect; shared competence, where member states have the authority to enact laws and impose sanctions if the Union has not. Lastly, supporting competence, where the EU adopts measures to support or supplement member states' policies.[150]European energy, as well as environmental policy, have been designated as a shared competence between the Union and the Member States under the terms of the Lisbon Treaty (Article 4 TFEU). The preservation, improvement, and protection of the environment's quality as well as the protection of people's health are the goals of the European Union's environmental policy. [151]These two policies often overlap.

2. European Climate Law

The European Commission's long-term strategy (2018) outlines the objective of a climate-neutral EU by 2050. As climate change poses significant risks, a more sustainable future is crucial. The EU has taken a global initiative to tackle climate change by setting a legally binding goal for itself to become climate neutral by 2050, as part of the European Green Deal. Achieving this goal requires a significant reduction in greenhouse gas emissions in the coming decades. As a first step, the EU has increased its 2030 climate ambition to reduce emissions by at least 55%. The "Fit for 55 package" is the EU's effort to update its regulations on environment, energy, and transportation to align with the 2030 and 2050

[149] (Europa E. P., n.d.)
[150] (Parliament-Europa, The Treaty of Lisbon, n.d.)
[151] (Eur-Lex, Division of competences within the European Union, n.d.)

goals. The package was presented by the European Commission in July 2021 and aims to provide a comprehensive and equitable framework for achieving the EU's climate goals. [152][153]The EU aims to be a leader in the global fight against climate change through fair and socially just goals that promote innovation and competitiveness in EU industry, while ensuring a level playing field vis-à-vis third countries.

Regarding the European Green Deal specifically, it is the top political priority of the new Commission (2019). The EU is committed to becoming the first continent with a stable climate, and the Green Deal is a comprehensive strategy for transforming environmental and climate change into opportunities while ensuring a just transition for all. It is the EU's new Growth Strategy that will impact almost all EU policies. Its goal is to turn the Union into a modern, resource-efficient, and competitive economy by 2050, with no net greenhouse gas emissions and no person or place left behind.[154]

The European Green Deal proposes a strategy for increasing resource efficiency, restoring biodiversity, and reducing pollution through the transition to a clean, circular economy. The plan includes necessary investments and available funding options and outlines steps to ensure a fair and inclusive transition. The EU aims to achieve carbon neutrality by 2050, which is why a European Climate Law (Regulation 2021/1119, effective July 29, 2021) was approved to make this political pledge a legal requirement. Achieving this goal requires action from all economic sectors, such as investing in environmentally friendly technology, promoting business development, and introducing cleaner, more affordable, and healthier modes of private and public transportation. The EU also aims to improve international environmental standards by increasing building energy efficiency, collaborating with foreign partners, and decarbonizing the energy sector.[155] Additionally, the EU will provide financial and technical assistance to those who will be most negatively impacted by the transition to a green economy through the Just Transition Mechanism, which will receive around 55 billion between 2021 and 2027.[156]

[152] (European Commission, n.d.)
[153] (European Commission, n.d.)
[154] (European Commission, n.d.)
[155] (European Commission, n.d.)
[156] (Commission, The Just Transition Mechanism: making sure no one is left behind, n.d.)

3. Conclusions on European Energy Policy

A basic strategy for organizing a valuable energy policy is centered around these rationales: First, energy supply must satisfy demand at prices that do not harm the European economy significantly. The rise of energy prices indicates a rise in all parts of the supply chain, increasing the prices of all products and services. This situation causes inflation and a mild or severe economic/financial crisis depending on the percentage of inflation and the government's response. In order not to disrupt social stability, energy prices in all parts of the supply chain must remain stable. Second, the most vulnerable customers must be safeguarded. If an energy crisis scenario occurs, the weak and vulnerable must be protected by a just nation that is ready to aid those in need and protect their quality of life. That way, everyone will have access to a fair energy supply, and there will be social stability. This is an important ethical consideration as access to energy is a basic need that should be met for all individuals. Third, policies should be compatible with the justification for investing in a sustainable energy system to protect Europe's structural potential to disengage from fossil fuel imports. Every energy policy action should be taken in accordance with sustainable energy solutions. Fossil fuels should not be at the center of the European Union's energy policy as the EU is an importer of a significant percentage of its energy from other countries, making it vulnerable to geopolitical disruptions and the use of exports as a weapon. Simultaneously, an inclusive, positive future for everyone is only possible using renewable energy sources. This highlights the need for a long-term strategy that prioritizes sustainable energy solutions.

It is evident that energy has been meaningful since the formation of the EU after WWII. EURATOM (1958) and even the ECSC (1952) were formed with considerations about energy materials. It is intriguing to contemplate that the emergence of a European Community on the European Continent was motivated by mineral materials matter, once again proving the interconnection of energy and security matters. [157][158]As a result, member states strive to ensure the security, long-term viability, and affordability of their energy supplies. The European Union's efforts to establish an energy single market and

[157] (EUR-Lex, Treaty establishing the European Atomic Energy Community (Euratom), n.d.)
[158] (EUR-Lex, Treaty establishing the European Coal and Steel Community, ECSC Treaty, n.d.)

promote the transition to a low-carbon economy demonstrate the importance of the energy sector in shaping Europe's future.

4. The Intergovernmental- Supranational Debate and How it Affects the Energy Sector in the European Union

The European Union has a legal personality that is distinct from the member states, making it an independent, distinct entity,[159]although it is not considered a fully sovereign entity. It is a supranational entity, but it cannot act as a sole entity in most decision-making areas, having received "chunks" of sovereignty from the member states over the years. Therefore, it consists of a unique form of state cooperation globally, as a supranational entity. The fact that the European Union has restricted competence in certain policy-making areas explains the way crises - whether political, financial, or energy-related - are tackled and how decisions are made overall. Given that the European Union is an experimental Union, member states have been hesitant to give sole responsibilities to the Union. The energy and defense sectors are among the sectors that the European Union shares competence in, and the prospect of them becoming fully EU sovereign sectors seems far away. This is because these sectors are considered crucial to states for projecting their power and ultimately supporting their survival. Crises over the years drove this model to adopt a "learn-as-you-go" philosophy. The European Union has been dealing with two crises since the beginning of the ongoing conflict in Ukraine in early 2022: a geopolitical crisis and an energy crisis. Although the danger is occurring outside EU borders, economic and trade relations, among other factors, shift that threat within the European borders. For some European Union members, for instance, Russia's invasion of Ukraine has increased their sense of urgency regarding the need to forge a more powerful and capable EU in the areas of security and defense.[160]

Traditionally, political power within the European Union had been shifting between these decision-making centers: Berlin, Paris, and London. London's hesitation to share competence led to Great Britain's exit from the EU, commonly known as BREXIT. The ongoing war in Ukraine has led to a big change. More specifically, the European Commission made a proposal for an emergency power to declare a general alert to all

[159] (Eur-Lex, Legal personality of the Union, n.d.)
[160] (Archick, 2023)

member states and mandate that every member state reduce its national gas consumption by 15% until spring 2023.[161]Germany, regarded as one of the continent's traditional power centers, and also heavily dependent on natural gas imports from Russia, accepted the proposal. This result is atypically establishing the EU's transfer of power from the edges to the center of Europe, so to the capital of Europe, Brussels. A possible energy sector collapse made political anti-centralization possible. The energy sector emergency changed the balance of power within the European Union.

In general, after the end of the Cold War and the official establishment of the European Union and the European Identity, the Union has been the center of numerous regional and global crises. From the Greek-Turkish serious disputes, the immigration crisis and the financial, to health emergencies, the response was more national, lacking a common official response. Ever since the climate change threat, the European Union has presented a common response, for example, by establishing the Energy Union and implementing the Fit for 55 packages. The EU is currently changing, and members are giving more competence.

Since its inception, the European Union has been striving for greater political integration to create a more unified and beneficial political entity. The European Union has already established several institutions, including the European Parliament and the European Commission, that have some level of decision-making power at the European level. Furthermore, the European Union has formed common policies in areas such as foreign and security policy, justice and home affairs, and economic and monetary union, to name a few.[162]Nevertheless, whether the European Union can become a full-fledged political union is still up for debate. There are still significant differences between member states in terms of political traditions, cultural values, and economic interests, making achieving a truly united political entity difficult. Furthermore, public opinion, geopolitical developments, and the ongoing debate over the appropriate balance between national sovereignty and European integration all have an impact on the EU's political integration. Crises may bring the EU together and lead to greater integration, but whether they will unify and fully integrate the European Union into a political union remains a question.

[161] (European Commission, 2022)
[162] (Eur-Lex, Division of competences within the European Union, n.d.)

The Case of Greece's Energy Sector

5. Introduction

Greece is situated in Southeast Europe at a focal point in the Eastern Mediterranean, within the Balkan coast.[163]Since the early, 1900's Greece has really been impacted by the geopolitical realignments of this area and ever since its establishment, in 1828 the modern Greek state has vigorously been fighting to gain and maintain its power, given its challenging geographic and geopolitical spot regionally.

Greece is a member state of the International Energy Agency (IEA) since 1976[164]and a member state of the European Union since 1981.[165] Greece accomplished economic reforms to join the European Union in 1980 and the Monetary Union in 2001, resulting in a period of relative stability and growth. Accordingly, Greece's energy needs increased rapidly in the 1990s and early 2000s, driven by this economic growth and a rise in consumer demand for energy.[166]However, the global financial crisis hit Greece hard in the late 2000s, exposing underlying weaknesses in the country's economy, such as a high level of public debt, a large informal economy, and a low level of productivity.[167]

Being reliant on the export of fossil fuels, is a state with limited autonomy in energy affairs, to keep up with its growing energy needs. However, over the last decade, successive Greek authorities have championed a variety of green initiatives in the areas of energy, environmental awareness, recycling, and transportation and infrastructure development. Regardless of geopolitical and technical hurdles, which academics and practitioners argue, and given the environmental impact of fossil fuels usage, renewables will be Greece's future.[168]

Greece as a European Union member state has inherently circumscribed powers to act on energy policy, as the EU legislation prevails in terms of energy and environmental

[163] (Climate Adapt, 2021)
[164] (IEA, IEA-Greece, n.d.)
[165] (Union-Europa, n.d.)
[166] (Kotios, 2000)
[167] (The Commission's intervention in the Greek financial crisis, 2017)
[168] (IEA, Greece 2023, 2023)

policy.[169]This is a significant measure since global problems such as climate change and the energy crisis can be significantly mitigated by coordinated planned actions and working collaboratively rather than individually. Furthermore, the European Union's common policy in critical national sectors where states have traditionally been hesitant to delegate authority is indicative of the EU's nature. Climate change mitigation research is critical not only for mitigating the effects of climate change and the energy crisis but in addition for understanding where the EU in its entirety is headed in the future.

In consequence, Greece is set to be climate neutral by 2050, abiding by the European Green Deal and the EU Fit for 55 Regulations concerning the total decrease of carbon dioxide emissions in 2030 by 55%.[170]The question for policymakers is how this will be accomplished. Considering that in 2020 the country cut down emissions by 18,7% according to EUROSTAT's annual report for 2020 is off to a good start. Greece had the largest reduction in carbon emissions in all the EU.[171]Also, energy industry emissions in Greece fell by nearly 45% between 2005 and 2019, accounting for 14% of total emissions in the European Union.[172] In addition, Greece is set to shut down all lignite for electricity by 2028, according to the NECP [173](National Energy and Climate Plan), heading full speed towards a green future.

Through the last decades, Greece has made a significant commitment to addressing climate change by signing onto several international treaties and agreements. Since 1994, Greece has been a party to the United Nations Framework Convention on Climate Change (UNFCCC), a multinational agreement that seeks to mitigate the effects of human activity on the climate system by maintaining greenhouse gas concentrations at a safe level.[174] Additionally, Greece ratified the Kyoto Protocol, which was adopted in 1997, that aims to reduce greenhouse gas emissions and mitigate climate change on a global scale. In 2016, Greece ratified the Paris Agreement, another critical international agreement that aims to reduce temperature increases to no more than 1.5°C above pre-industrial levels and keep them below 2°C.[175] As part of its commitment to mitigating climate change, Greece has also developed a comprehensive National Energy and Climate Plan (NECP) that outlines the country's goals and obligations for reducing greenhouse gas emissions and promoting the use of renewable energy sources. The NECP sets ambitious targets for reducing greenhouse gas emissions from the energy, transportation, and agriculture

[169] (Eur-Lex, Division of competences within the European Union, n.d.)
[170] (Europa C. , n.d.)
[171] (Eurostat, CO2 emissions from energy use clearly decreased in the EU in 2020, 2021)
[172] (Parliament, 2021)
[173] (National Energy and Climate Plan, 2019)
[174] (Change, n.d.)
[175] (Affairs, 2020)

sectors, as well as increasing the share of renewable energy in the country's energy mix.[176]Through its participation in these international treaties and agreements, as well as its domestic initiatives, Greece is taking significant steps toward addressing the global challenge of climate change.

6. The Characteristics of Greece's Energy Security Status

Greece, since its establishment, has been reliant on energy imports, particularly on oil.[177]However, importing energy resources, specifically fossil fuels such as oil, gas, and coal, has left Greece vulnerable to energy price fluctuations and geopolitical pressures from exporters. This vulnerability has been compounded by the potential for energy weaponization, a common occurrence in international politics. Below, I will examine Greece's energy security status, focusing on the country's historical reliance on energy imports and its recent efforts towards energy diversification and independence. Through this analysis, I will argue that while Greece still faces energy security challenges, the country's recent initiatives demonstrate promising progress toward greater energy resilience and sustainability.

Even though the Oil Crises that altered the course of energy security, occurred in 1973 and 1979,[178]it is noteworthy that since 1965, oil has been Greece's primary energy source, and the country's reliance on oil imports remains high, accounting for twice the percentage of the second most popular energy source, natural gas. Specifically, in 2021 Greece's primary energy source was oil at about 49%, with gas coming in second place at 24%. In third place stands wind energy with about 10% of the total energy usage. It is impressive to notice that in 2019 the share of coal in the energy mix was at 12% and by 2021 fell to 7% abiding by Greece's 2028 plan to completely shut down lignite production. Up until 2018, coal was the second biggest energy source in the Greek energy mix, and the decrease in its usage was replaced mainly by gas. So, gas usage grew from 15% in 2017 to about 24% in 2021. Simultaneously wind share in the Greek energy mix increased by about 4% in 2 years, since 2019.[179]The wind energy sector in Greece presents great possibilities due to the country's position and climate and has even greater possibilities to be increased the next year.[180]

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[176] (National Energy and Climate Plan, 2019)
[177] (IEA, Greece 2023- Energy Policy Review)
[178] (Salameh, 2004)
[179] (Roser, Hannah Ritchie and Max, n.d.)
[180] (Hannah Ritchie, Energy, 2022)

The high dependence degree on Russian fossil fuels imports is evident. Russia has proven through weaponizing its exports, that is not a reliable partner, imposing a big problem not only to Greece but all of the European Union. This is proof of the pathogenesis of the Greek energy system and planning, which has failed to long term consider a way out of fossil fuels. Greece's geomorphic is prosperous in designing and maintaining an energy system almost completely based on sustainable sources of energy. This dependency and the global climate change threat are leading the way toward greener energy. Greece aspires to expand its green energy capacity by 2030, with green energy accounting for at least 70% of its energy mix, in line with its commitments under the Paris Agreement on climate change.[181]

From these statistics, we can conclude that: First, Greece has an ongoing dependency on oil imports. Second, the wind energy sector represents great potential, and since 2021 wind hydro and solar made up 20% of primary energy sources.[182]These statistics raise the question of how the current hazardous dependence on oil will diminish and how likely it is that the energy transition will take place. As to 2022, after the conflict in Ukraine, Greece, like other European nations, reduced its reliance on Russian gas by importing more liquefied natural gas (LNG) imports from the USA, to satisfy its demands.

7. National Plan for Energy and Climate (NPEC)

The answer to the above questions: whether the renewable energy sources percentage will continue to rise and how the high dependency on oil will drop, can be found in the National Plan for Energy and Climate (NPEC Plan). The NPEC is a 10-year integrated national energy and climate plan for the years 2021 to 2030, designed to assist countries in meeting the European Union's energy and climate targets for 2030. The rules, which were introduced as part of the Regulation on the Governance of the Energy Union and Climate Action, required the final NPEC to be submitted to the Commission by the end of 2019. The national plans detail how European Union countries intend to address energy efficiency, renewables, greenhouse gas emissions reductions, interconnections, research and innovation. This approach necessitates purpose coordination across all government departments. Because all European Union countries are using a similar template, they can collaborate to improve efficiency across borders.[183]

[181] (National Energy and Climate Plan, 2019)
[182] (Hannah Ritchie, Energy, 2022)
[183] (European Commission, n.d.)

According to the Greek NPEC, renewable energy sources should be Greece's primary national energy source by 2030, accounting for 65% or 70% of total power generation[184]in accordance with the Paris Agreement. Therefore, to meet this challenging goal and the overall energy and climate targets by 2030, the European Commission asked EU member states to develop and implement their individual National Energy and Climate Plans (NECPs).[185]

In particular, Greece enacted a National Plan for Energy and Climate (NPEC) in December 2019 to combat climate change and preserve the environment, primarily through renewable energy sources. According to the National Plan, decarbonization, or the end of Greece's reliance on lignite, is a high priority, with renewable energy sources expected to account for 65% of power generation by 2030, making renewable energy the primary national energy source in Greece.

Indeed, during the previous three years, Renewable Energy Sources have increased their proportion of daily energy consumption. According to the Greek Independent Power Transmission Operator (IPTO / ADMHE), from 42% of daily energy demand on 21/3/2019 to 51% on 14/9/2020 and 59% on 6/9/2021, the daily percentage of renewable energy sources in Greece has been rapidly increasing. Furthermore, wind energy accounted for 48% of the Renewable Energy Sources mix in 2021, with solar energy accounting for 10% and the other Renewable Energy Sources accounting for 1%.

Currently is of key importance to make renewable energy sources more appealing. The Greek government is developing renewable energy and energy storage policies. The draft law's main objectives are to reduce the average licensing time for new RES projects from five years to 14 months, develop electricity storage projects with an installed capacity of at least 3.5 GW by 2030, and increase the capacity of the electricity network to allow for the integration of more RES units. The primary goals are to increase the proportion of Renewable Energy Sources (RES) in the country's energy mix to 35% and to increase national power generation to 70%. The measure would also offer municipalities and provincial authorities' incentives to build Renewable Energy Sources units to supply cheaper electricity to underprivileged communities. Also, Green energy has a great benefit of ensuring energy supply and security in the event of an energy or geopolitical crisis.

According to a Greek survey, it was estimated that the EUR 8.91 billion needed to implement the NPEC's targets by 2030 will contribute EUR 6.83 billion to Greek GDP, EUR

[184] (National Energy and Climate Plan, 2019)
[185] (European Commission, n.d.)

2.25 billion to employee compensation in terms of pretax wages, EUR 3.70 billion to the formation of fixed capital assets, and approximately 154 thousand job positions over a 10-year period, 2020 until 2030. These consequences are mostly a result of expenditures in solar and wind energy generation. Furthermore, the positive multiplier effects of the renewable energy sources investment plan appear to be large enough to offset any negative consequences from reduced subsidies and support for power production. As a result, the more ambitious objectives established in Greece's new energy and climate strategy in the NECP 2019, for increased Renewable Energy Sources penetration in the energy mix are properly directed and poised to bring substantial economic advantages to the economy.[186]

8. Mediterranean Oil- Gas fields

Greece is home to a significant amount of gas and oil resources. Greece has abundant oil and gas resources, particularly in the Aegean and Ionian Seas, as well as in the Exclusive Economic Zone (EEZ) near Crete and Cyprus. The Prinos oil field in the Aegean Sea is one of Greece's largest oil fields, but there are also smaller oil fields in the Ionian Sea. Furthermore, the eastern Mediterranean has several offshore gas reserves, including the Aphrodite gas field near Cyprus and the "South Crete" and "West Crete" gas fields in the EEZ near Crete.[187]

The Eastern Mediterranean region is thought to contain roughly 1.7 billion barrels of oil and 122 trillion cubic feet of natural gas, according to a reputable US geological report from 2010. These figures are insufficient to indicate a major effect on the world's energy balance, but they have a considerable impact on the power dynamics in the local area.[188]Drilling has shown most of the gas deposits to be in the Exclusive Economic Zones (EEZ) of Cyprus, Israel, and Egypt.[189]These deposits seem to be economically viable and might turn these three nations from significant energy importers to self-sufficiency even exports. They may also somewhat lessen Europe's reliance on Russian gas for energy. Additionally, the Eastern Mediterranean region has the potential to develop into a significant energy production hub, further increasing its geopolitical relevance, because of the recent hydrocarbon discoveries in the area. Even if the energy reserves are not as large as those in the Persian Gulf or the Caspian Sea, they are nonetheless sufficient to

[186] (Stamopoulos, 2021)
[187] (IENE, 2015)
[188] (Πλατιάς, Ενεργειακοί Ανταγωνισμοί, 2018)
[189] (Overview of oil and natural gas in the Eastern Mediterranean region, 2013)

alter the geopolitical balance in the area and perhaps lessen Europe's reliance on Russian energy.

However, the economics of gas is complicated. Contrary to oil extraction, the extraction of natural gas and particularly its transportation via pipelines or LNG liquefaction facilities is expensive and requires substantial expenditures that take years to pay off.[190]Additionally, to provide economies of scale (the relationship between the size of a plant or industry and the lowest possible cost of a product in economics. When a factory increases output, the average cost of a product usually decreases. This is referred to as economy of scale,[191]such infrastructure often needs access to the abundant energy resources of two to three nearby nations. Therefore, geopolitical stability, collaboration, and a long-term view are required for such significant infrastructure expenditures to occur. But with existing geopolitical instability, investing the money needed for infrastructure is unlikely. Consequently, the question is could the geopolitical rivalry be mitigated in the Eastern Mediterranean, so the gas extraction investment pays off? Geopolitical instability in Eastern Mediterranean has deep roots and is a timely challenge for the nations of the Eastern Mediterranean**.** Beyond the prospect of the exploitation of gas and also oil resources in the Aegean Sea, near Cyprus, lay in geopolitical terms in an unrestful position near the Middle East, Israel, Turkey Libya, Egypt and Greece, that form two "teams" with opposing interests. Therefore, this plan presents many costs and not so many benefits.

A main source of instability in Eastern Mediterranean is the dispute between Greece and Turkey. Greek -Turkish relations have always been challenging. At this moment, Turkey acts as a strategic spoiler in the Eastern Mediterranean, setting a "diplomatic trap" with the intention of either "trapping" hydrocarbons on the bottom of the Eastern Mediterranean or imposing its own rights. Moreover, over the years Greece's foreign policy with adversaries like Turkey has been defensive and unresistant. Particularly following the demise of Greco-Turkish relations, after the 1974 unlawful invasion of the northern part of Cyprus, Greece lacked the means to change the status quo. Since then, Turkey has violated the borders, demands the Treaty of Lausanne to be redefined, does incursions in the Aegean Sea daily and established a casus belli (threat of war) in 1995 in case Greece decides to extend its territorial waters from 6 nautical miles to 12 as it has the right according to the Law of the Sea. Moreover, Turkey has proceeded in the exploration and prospection of oil and natural gas in the Aegean Sea and near Cyprus without permission. Therefore, from the arbitrary and unilateral demarcation of the EEZ for Turkey and the "state" of Turkish Cypriots, which disputes the Greek and Cypriot EEZ,

[190] (Πλατιάς, Ενεργειακοί Ανταγωνισμοί, 2018)
[191] (The Editors of Encyclopaedia Britannica, , n.d.)

the casus belli against Greece if it expands its territorial waters in the Aegean and the use of blackmail diplomacy by sending its own drilling rigs escorted by warships to drill illegally in the Cypriot it can be concluded that Turkey is sending a 'message which was crystal clear: without Turkey's permission, it is impossible to utilize the Eastern Mediterranean's energy resources.[192] In addition, the Ionian Sea is the home of one the most earthquake-prone areas in the world and the number one earthquake- prone area in Europe.[193]Inevitably the cost of the prospect of an environmental disaster surpasses the benefits of this plan. Also, in the Ionian Sea, is a passage of some of the biggest sea mammals, "Cetaceans " of the Mediterranean Sea,[194] and the exploitation would act as a disruptive force for the Mediterranean's natural habitat. Therefore, it is preferable to use renewable resources, besides the environmental reasons, as exploitation of natural gas resources in the Eastern Mediterranean requires Turkish clearance.

9. Pipelines

Since December 2019, the Greek government has pushed through a variety of energy-related reforms.[195]As a result, the country's environmental objectives have shifted dramatically. Greece is emerging as an important regional energy center at the crossroads of Europe, Asia, and Africa, and it could use this position to help the EU transition from natural gas to renewable energy sources.[196]Greece aims to develop into a significant regional hub for trade, energy, and transportation. For instance, due to its focus on building infrastructure for commerce, logistics, energy, and digital technologies, Greece was also the first Western European country to elect to join the new "Silk Road" Belt and Road program. Greece is interested in collaborating in this area and believes it can learn a lot about technological leapfrogging from China,[197]Greece hopes to establish itself as a major East-to-West and South-to-North energy transportation hub.[198]

Greece has also invested in infrastructure projects such as LNG ports and pipelines to achieve its cross-border energy goals. For example, one of the most significant LNG ports in Europe is in Revithoussa,[199] a small island in the Saronic Gulf that administratively

[192] (Πλατιάς, Ενεργειακοί Ανταγωνισμοί, 2018)
[193] (EFEHR, 2021)
[194] (Archipelagos, 2016)
[195] (National Energy and Climate Plan, 2019)
[196] (Energy Diplomacy, n.d.)
[197] (Πλατιάς, Ενδυνάμωση της γεωοικονομικής σχέσης με την Κίνα, 2018)
[198] (Energy Diplomacy, n.d.)
[199] (Energy Diplomacy, n.d.)

belongs to Salamina and which received the first American shale gas shipments to reach Europe.

Moreover, concerning the pipeline projects the Trans Adriatic Pipeline (TAP) is the last part of the Southern Gas Corridor. The Southern Gas Corridor is an initiative of the European Commission for a natural gas supply route from the Caspian and Middle Eastern regions to Europe, proposed in 2008. The goal of the Southern Gas Corridor is to reduce Europe's dependency on Russian gas and add diverse sources of energy supply. The total length of the Corridor is 3,500 kilometers, which is divided into three sections: the South Caucasus Pipeline (SCP) from Baku to Erzurum in Turkey, the Trans-Anatolian Pipeline (TANAP) crossing Turkish territory up to the Greek border at Kipoi-Evros and the Trans-Adriatic Pipeline (TAP) through Greece, Albania and the Adriatic Sea to Italy.[200]

Another pipeline project is the Interconnector Greece-Bulgaria (IGB), which started commercial operations in October 2022, providing Caspian gas to Bulgaria and enhancing energy security in one more European country. Specifically, the 2nd Phase foresees TAP interconnections in Greece, with Bulgaria first through the Interconnector Greece-Bulgaria (IGB).[201]The IGB project consists of a 182 km pipeline, of which approximately 31 km are on Greek territory, with associated support facilities such as metering stations, valve stations, and an operation center. The Interconnector IGB starts in Komotini (Greece) and ends in Stara Zagora (Bulgaria) and acts as a strategic gas transportation infrastructure providing diversification of gas supply to the Bulgarian and Southeast Europe gas market.[202]

Another initiative that is expected to be implemented within the next two years and is planned in collaboration with the Greek Government and TAP. A floating storage and regasification unit (FSRU) in Alexandroupoli. The FSRU in Alexandroupoli is designed to act as an import terminal for liquefied natural gas (LNG), enabling the regasification of LNG and supplying natural gas to the Greek market and surrounding areas. The project aims to improve Greece's energy infrastructure, broaden the country's energy supply, and encourage the growth of the regional gas market. A project of significant geopolitical significance as it has the potential to reduce the dependence of nations in South-Eastern and Central Europe on Russian gas such as Bulgaria, Romania, Hungary and Ukraine.[203]

[200] (Pipeline, n.d.)
[201] (Karagianni, 2022)
[202] (Energy Diplomacy, n.d.)
[203] (Gastrade, n.d.)

10. EastMed Pipeline

The East Med Pipeline, which may transport a sizable portion of the output from the Eastern Mediterranean (Israel, Cyprus, and Egypt) to the European Union through Greece and Italy, is the most significant of the planned projects. Any gas resources found in Greece, mostly south of Crete, might be connected to this pipeline. This would boost Greece's standing inside the EU.

Specifically, the EASTMED is a pipeline under construction. The Eastern Mediterranean pipeline, commonly known as EastMed, is a proposed offshore-onshore natural gas pipeline that would connect the energy resources of the East Mediterranean to mainland Greece by passing via Cyprus or Crete. It is planned to carry natural gas from the Levantine Basin's offshore gas deposits to Italy and farther,[204]directly linking East Mediterranean resources and connecting with the offshore Poseidon pipeline. Together with the Poseidon pipeline, it will carry gas to Italy and other markets in Europe, including Southeast Europe, enhancing the security of Europe's gas supply and removing Cyprus and Crete's exclusion from the continent's gas markets. The Greek parliament has acknowledged the EastMed project as being of national significance and public interest. It is also an EU Project of Common Interest.

On March 20, 2019, then Secretary of State Mike Pompeo was also present in Tel Aviv when the Energy Triangle—Greece, Cyprus, and Israel—signed an intergovernmental agreement for the EastMed gas pipeline as a show of support from Washington for the initiative. The signing of the Intergovernmental Agreement between Cyprus, Greece, and Israel in January 2020 provided the basis for the construction of the EastMed.

However, Washington stated in a letter in January 2022 that it would no longer support energy projects that are not environmentally friendly. Officials also criticized the project's lack of economic and commercial feasibility as well as its potential to aggravate already existing regional tensions. Supposing the building of the pipeline, the EEZ zones that are a reason for tension in the region would be regulated. But the primal decision of the agreement's part excludes from conversations Egypt and Turkey. Also, given that the future plans are green transition, is it not viable to invest in a new pipeline project. Another issue of this project is that officials from Israel and Greece stated last year that they were considering ideas to reroute the EastMed pipeline so that it would run via Egypt

[204] (Energy Diplomacy, n.d.)

instead of Cyprus. The argument for the EastMed was undercut by a contract for the transportation of Israeli gas that Egypt and Israel also signed.[205]

Greece has been historically connected to be an ally to the Western block and has always been an important ally to the USA. However, there should be no mistaking the boundaries of this relationship. No American government will provide military assistance to Greece in its conflict with Turkey. Even if their relationship is at its lowest point, the United States continues to value Turkey geopolitically. As a result, US policy towards Greece is de facto-constrained. The most that Greece might hope for from the US is that it would serve as an "honest broker" between the two nations and will use diplomatic channels to counter Turkish revisionism.[206]

In conclusion, the EastMed project aims to connect the natural gas resources of the East Mediterranean to mainland Greece and the rest of Europe via a proposed offshore-onshore pipeline.[207] While the project has been acknowledged as being of national significance and public interest by the Greek parliament and an EU Project of Common Interest, it has also faced criticisms, particularly regarding its potential environmental impact and economic feasibility, as well as its exclusion of Egypt and Turkey from the initial agreements. Furthermore, recent developments, including the US withdrawal of support due to environmental concerns and the disruption of traditional pipeline routes to Europe due to the conflict in Ukraine, highlight the complex and politically sensitive nature of energy policy.[208]Ultimately, achieving energy security and sustainability in the region will require careful consideration of the economic, environmental, and geopolitical factors at play. All in all, the flow of natural gas through pipelines can be characterized by complexity and transnationality, since pipelines cross national borders, the nations except for the technical and economic and environmental aspects must deal also with the political and international aspects.[209]Another reason why energy policy cannot be excluded from politics. Investment in Renewable Energy Sources is a solution to the consequences of the intersection of energy dependence and geopolitics.

[205] (Φαραντούρης, 2022)
[206] (Πλατιάς, Ενδυνάμωση της γεωπολιτικής σχέσης με τις ΗΠΑ, 2018)
[207] (Energy Diplomacy, n.d.)
[208] (Φαραντούρης, 2022)
[209] (Moniek de Jong, 2023)

11. Energy Security and Energy Independence Through Investing in Renewable Energy Sources- Conclusion

In conclusion, adopting a more favorable renewable energy policy is the solution. Greece is proficient at utilizing renewable energy sources. Given its abundant solar and wind resources, Greece has great potential for utilizing renewable energy sources, particularly solar and wind energy. The country has about two-thirds of the year of sunshine and high altitudes that allow for wind power generation. In recent years, Greek governments have made a concerted effort to encourage the use of renewable energy in the country, setting ambitious targets for the expansion of renewable energy capacity. As a result, renewable energy sources now account for a greater share of Greece's entire energy mix, specifically renewable energy sources as a primary energy source covered in 2020 about 22% of the total national energy mix.[210]

Following the implementation of new legislation in the 1990's that offered support and incentives for renewable energy development, Greece began adopting renewables on a larger scale in the late 2000's, when the licensing procedure for RES projects was simplified, resulting in increased investment in RES projects.[211]

The law established a feed-in tariff system that secured fixed prices for renewable energy producers, thereby making it simpler for them to find funding and invest in new projects. The legislation also established renewable energy targets that Greece aimed to achieve, with a goal of reaching 20% by 2020. Greece has taken major steps in evolving its renewable energy sector since then, with a particular emphasis on wind and solar power. According to the International Energy Agency, Greece's renewable energy capacity grew to 9.87 GW in 2022, primarily driven by wind and solar power.[212] Greece has set a target of 35% renewable energy in final energy consumption by 2030, in line with its commitment to the European Union's clean energy goals. [213]Nonetheless, the country faces obstacles in expanding its renewable energy sector, such as grid integration issues and regulatory barriers.

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[210] (Enerdata, n.d.)
[211] (Energiewende, 2016)
[212] (IEA, Greece 2023- Energy Policy Review)
[213] (European Commission, n.d.)

According to IPTO, Greece's independent power transmission operator, the first week of October 2022 marked the first time that all the nation's electrical needs were met by renewable energy. Specifically, Greece's electricity generation from renewable sources peaked at 3,106 megawatt-hours on Friday, October 7, 2022, for at least five hours. Solar, wind, and hydropower accounted for 46% of the nation's energy mix in the first 8 months of this year, up from 42% at the same time in 2021, according to The Green Tank, a Greek environmental think tank. According to Green Tank, there is a track record of optimism for the country's transition to sustainable energy, weaning off fossil fuels, and preserving energy sufficiency. Greece's success demonstrates that a system powered primarily by renewable energy sources is not inconceivable.[214]The above demonstrates unequivocally that the electrical grid can be powered by renewable energy sources while remaining reliable. The electricity sector could be produced entirely from wind, water, and sun (WWS) power by electrifying all energy-related sectors, including transportation, heating/cooling, manufacturing, agriculture/forestry/fishing, and telecommunications.[215]

Therefore, in practice, Greece has the potential to be powered entirely by renewable energy, particularly electricity, supported by favorable weather conditions in the country. To transition to renewable energy, the country's energy infrastructure would need to undergo significant changes, which would require a significant amount of work and adjustment.[216]A variety of factors, including the country's energy needs, energy consumption habits, resources, and political and economic context and regulations would determine the feasibility and suitability of such a transition.

Greece would need to take a variety of initiatives to make the transition to a larger percentage of renewable energy. Developing a more compact strategic plan would elucidate the steps necessary to achieve a significant increase in the adoption of renewable energy. This could involve identifying the renewable energy sources that are most compatible with the nation's energy needs, like wind and solar, which in 2021 made up about 20% energy mix, so the tries focus on building trust on these initiatives.[217]The next step is establishing targets for renewable energy deployment and identifying the necessary infrastructure and resources to facilitate the transition. This for example includes retrofitting current energy infrastructure: To boost the share of renewable energy in the energy mix, current hydroelectric, solar, or wind energy infrastructure may be improved or modified. At the same time, changes to energy policies and regulatory frameworks might include establishing criteria or objectives for the use of renewable

[214] (Euronews.green, 2022)
[215] (Jacobson, 2017)
[216] (IEA, Greece 2023- Energy Policy Review)
[217] (IEA, Greece 2023- Energy Policy Review)

energy, as well as providing incentives for the deployment of renewable energy, such as feed-in tariffs or renewable energy credits.[218] Consequently, providing initiatives to make people favorable to renewables is important as well as providing economic motivation for net metering.

In Greece, achieving a transition to sustainable energy practices requires not only significant economic resources but also a fundamental shift in the societal narrative and prevailing social norms concerning climate change. This transformation demands a comprehensive and coordinated approach that targets the underlying cultural and behavioral factors that perpetuate the current status quo. As a result of factors such as age, education and socioeconomic status, people's attitudes toward climate change action in Greece may vary. However, there is evidence that Greece, like many other countries, has encountered difficulties in promoting widespread acceptance and adoption of sustainable practices. According to a 2019 Eurobarometer poll, only 11% of Greeks believe climate change is the most serious problem facing the world today, compared to the European Union average of 60%.[219]Furthermore, environmental groups and the European Union have chastised Greece for its slow progress in implementing renewable energy policies and addressing air pollution.[220]By promoting a shared vision of sustainability and fostering a culture of eco-awareness and responsibility, it may be possible to achieve a meaningful and lasting shift towards more sustainable energy practices in Greece.

Change can be challenging for people and may trigger resistance, particularly when it involves a substantial alteration in their way of life or jeopardizes their sense of security or identity. This is true across several domains, including technology, social norms, and political systems. With regard to the transition to renewable energy sources, individuals may resist changes in their energy sources or consumption patterns due to concerns about reliability and cost, as well as perceived social norms and expectations around energy use. Any significant change can lead to social unrest and political instability. The shift to renewable energy is likely to result in job losses in the fossil fuel industry, which could further exacerbate social and economic inequalities. [221]But renewable energy employment is increasing worldwide and can be intensified in accordance with the rates of greener energy transition.[222]However, a state that protects and supports those in more vulnerable positions, or a welfare state, will yield more long-term social and economic

[218] (IEA, Greece 2023- Energy Policy Review)
[219] (Commission, Special Eurobarometer 490- Climate Change, 2019)
[220] (IEA, Greece 2023, 2023)
[221] (Kemp, 2020)
[222] (Czako, 2020)

benefits than short-term economic losses. Ultimately, supporting those in need, regardless of the circumstances, can lead to greater social, political, and economic stability and equality. The importance of social investment in creating the conditions for economic growth is evident throughout the European Union. New forms of collaboration, particularly community-based initiatives, are emerging, and these have a positive impact in a variety of ways. For social protection needs, public funding is deemed affordable and adequate. Private funding is successfully leveraged, subject to clear, well-established, and well-enforced conditions of effectiveness and equity.[223]

Conclusion of thesis

In conclusion, energy dependence is damaging and must be avoided, as evidenced by the chronic interdependence of states in the energy sector and the dominance of fossil fuels in the global energy mix, which has very serious consequences for national security and, more recently, the environment. Energy dependence causes energy insecurity. The solution to this problem is to invest in renewable energy sources and eliminate energy dependence.

Energy security and national security are closely linked issues that have significant implications for the stability and prosperity of nations. In fact, energy security is inherently a political and international relations issue and is defined in international relations (IR) as a country's ability to access the energy resources required to maintain its current level of national power without jeopardizing its foreign policy, economic goals, social goals, or environmental goals.[224]As such, energy security should be a priority for policymakers and leaders at all levels, and effective energy policies and strategies should be developed and implemented to ensure that nations are able to meet their energy needs in a sustainable and secure manner.

As the world's demand for energy continues to rise, energy security has emerged as a critical component of national security. Providing access to reliable and affordable energy sources that do not contribute to climate change while also reducing reliance on foreign sources has become a major challenge for many countries. In this context, diversification of energy sources, and investment in renewable energy sources, is the key to enhancing

[223] (Milotay, 2022)
[224] (Paravantis, 2019)

energy security and protecting national security. Examples of energy-related conflicts include fossil fuel conflicts, in which fossil fuels are either the cause or the means of conflict. From the Middle East, where the largest oil deposits are located,[225]to the Eastern Mediterranean, where the discovery of gas and oil deposits, and thus the EEZ rivalry between Greece and Turkey, endangers the countries' relations,[226] to the recent example of Russian invasion in Ukraine, where gas flow in the EU was severely disrupted, resulting in a severe rise in fossil fuel prices and an ongoing energy crisis.[227] Essentially, fossil fuels, commerce between countries and price volatility have been and will continue to be sources of dispute. This pessimistic viewpoint is based on the teachings of realism theorists, who believe that the international system is dominated by insecurity and competition because of the absence of governing power. As a result, nations in the international system compete to gain more power, become more powerful, and ultimately achieve sovereignty.[228]Fossil fuels play an important role in this, as they are regarded as a great means of achieving and sustaining power, as they influence economies and all other sectors that follow.

The cruciality of the energy sector for the economy and the nations altogether was evident during the birth of the ESSC. The Union in 1952, during the Treaty of Paris, and later in 1958 with the creation of the Atomic Community, incorporated energy-related politics, which were then crucial to avoid war and achieve peace in the continent.[229][230][231]Currently, the European Union includes the energy and environmental sector as a shared competence between the Union and the Member States under the terms of the Lisbon Treaty (Article 4 TFEU).[232]

The transition to clean energy is a complicated and multifaceted issue. Economic considerations, resource availability, and international conflict are not the only factors driving the need for an urgent energy transition path. As the effects of climate change become more apparent and the urgency to address them grows, the trend toward renewable energy is likely to accelerate. Addressing the global challenge of energy security and transitioning to sustainable energy systems will require international cooperation and coordination, as it has already done.[233] While the transition may be

[225] (Middle East and North Africa, 2022)
[226] (Πλατιάς, Ενεργειακοί Ανταγωνισμοί, 2018)
[227] (Leggett, 2022)
[228] (Bell, 2022)
[229] (EUR-Lex, Treaty of Rome (EEC), n.d.)
[230] (EUR-Lex, Treaty establishing the European Atomic Energy Community (Euratom), n.d.)
[231] (EUR-Lex, Treaty establishing the European Coal and Steel Community, ECSC Treaty, n.d.)
[232] (Eur-Lex, Division of competences within the European Union, n.d.)
[233] (Commission, International cooperation in clean energy research and innovation, n.d.)

difficult, the potential benefits of lowering greenhouse gas emissions, improving energy security, and promoting long-term economic growth make it a necessary and worthwhile endeavor.[234]As a global issue that threatens the viability of all factors of the international system, it is important for nations to work together to address common energy security challenges through international cooperation and the development of multilateral mechanisms.

Furthermore, because of the increased use of renewable energy sources and falling prices for renewable technologies,[235] the global energy landscape is already rapidly changing. This transformation is already changing the geopolitical dynamics of the energy sector and may have an impact on how future battles for control of energy resources are fought. There are several ways that the transition to renewable energy could affect energy geopolitics: decentralization of energy: as more countries and regions shift to renewable energy, energy production may become more decentralized, with a greater number of smaller-scale energy producers, reversing the traditional model of a few large energy-exporting countries dominating the global energy market. [236]Above all, increased energy independence: As countries and regions become more reliant on domestic renewable energy sources, they may become less reliant on energy imports from other countries. This could reduce the geopolitical influence of energy-exporting countries while increasing energy independence in energy-importing countries, spreading stability throughout the international system, and allowing nations to be more powerful.

Global fossil fuel domination is connected to energy dependence. This has a double meaning. First, possible disputes when the relationship balance between producers and consumers breaks. Second, environmental catastrophe if the climate change effect continues. The problem is so severe that only a 1.5 Celsius increase on earth’s temperature is crucial.[237]The only solution is, therefore, investment in a greener future. As mentioned before RES can be used in different combinations, to fit any area's, or society's needs, as there are many forms available (solar, wind hydro, biomass, etc.). However, it is important for initiatives to exist to establish a greener future culture. In the short term, more initiatives to invest in RES: better grid connection, financial assistance on investments, and feed-in tariffs, as it has already been implemented, but from now on a greater scale. Also, investment in RES for electricity purpose is especially important. In some areas like Greece, although there are initiatives and legislation, the percentage of

[234] (UN, Climate Action, n.d.)
[235] (UN, Climate Action, n.d.)
[236] (Gonçalves, 2021)
[237] (IPCC, 2022)

fossil fuel imports is still big.[238]In the long term is necessary to invest in continuing education. Transition to Res is not only changing our electricity methods but also, the way we view and use energy.

An interruption in the supply of oil, gas, or electricity can have serious consequences for society, economies, and people. As a result, energy security may be regarded as beneficial to society as a whole. Consequently, the energy sector should be safeguarded and independent.

[238] (IEA, Greece 2023- Energy Policy Review)

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